Railroad Age Gazette

Including the Railroad Gazette and The Railway Age

PUBLISHED EVERY FRIDAY BY
THE RAILROAD GAZETTE (INC.), 83 FULTON STREET, NEW YORK.

CHICAGO: 160 Harrison St. PITTSBURGH: Farmers' Bank Bldg.
LONDON: Queen Anne's Chambers, Westminster.

W. H. BOARDMAN, *President and Editor.*
E. A. SIMMONS, *Vice-President.* RAY MORRIS, *Sec'y and Man'g Editor.*
R. S. CHISOLM, *Treasurer.*
The address of the company is the address of the officers.

Subscription, including regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free.

United States and Mexico.....$5.00 a year
Canada.....$6.00 a year
Foreign Edition, London.....£1 12*s* ($8.00) a year
Single Copies.....15 cents each

Entered at the Post Office at New York as mail matter of the second class.

VOL. XLV., NO. 22. FRIDAY, OCTOBER 30, 1908.

CONTENTS

EDITORIAL:
Freight Car Demurrage on the New Haven.....1233
Method of Reporting and Studying Rail Failures on the Harriman Lines.....1233
The Fiscal Horoscope of the Railroads.....1233
Freight Car Demurrage.....1234
Baltimore & Ohio.....1236
St. Louis Southwestern.....1237
Denver & Rio Grande.....1239
New Publications.....1240

ILLUSTRATED:
The Beech Grove Shops of the Big Four.....1245
Twelve-wheel Mallet Compound Locomotive for North China.....1250
Rebuilding an Interlocking Plant.....1254
Moving Loads on Concrete Bridges.....1255
Sellers' Non-Lifting 1908 Injector.....1258

LETTERS TO THE EDITOR:
Demurrage on Private Cars.....1241
Scientific Valuation in Wisconsin.....1242
Weight of Locomotives 1881-1900.....1242

MISCELLANEOUS:
Successful Experiment in Pre-Cooled Fruit Shippink by Northern Pacific.....1243
Work of the C., M. & St. P. in Tacoma and Seattle.....1243
Bridges and Buildings Convention.....1243
Pacific Locomotive for the Chicago & Alton.....1244
Northern Pacific Double Track between Seattle and Tacoma.....1244
The Legal, Economic and Accounting Principles Involved in the Judicial Determination of Railroad Passenger Rates.....1252
President Ripley on the Future of the Atchison.....1255
Shop Notes.....1256
The Freight Problem on Manhattan Island.....1257
Foreign Railroad Notes:
French Demurrage Rules.....1242
The Spirit of Railroad "Labor" in Egypt.....1244

GENERAL NEWS SECTION:
General News.....1261
Traffic News.....1263
Equipment and Supplies.....1266
Railroad Officers.....1272
Railroad Construction.....1274
Railroad Financial News.....1276

Returns showing the potential reduction of the per diem charge for car detention are of striking and suggestive interest in the case of the New Haven Company, not long ago a very heavily debtor line. The six months beginning with March, 1908, return $217,494 as the net charge against the company as compared with $944,320 during the corresponding period of 1907, or a reduction of somewhat more than 77 per cent. The major factor of reduction is, of course, the cut of the per diem from 50 to 25 cents which benefits all debtor lines and another element is reduced business. But more interest attaches to the use of new equipment on its own lines by the New Haven and most acute interest of all to the extent to which, by the strength of its territorial grip on southern New England, it has been able to dictate a car for car exchange. This last is a harbinger of what the company may be able to do when through the legal and actual, as contrasted with indirect control of the Boston & Maine its monopoly of New England becoming practically complete. Radical domination of extensive territory prolific in high class freight and big passenger business is likely then to produce some other impressive phenomena in relation to connected lines as well as in car demurrage.

Bulletin 102 of the American Railway Engineering & Maintenance of Way Association contains preliminary reports of the committee on rail. One of these relates to recommended rail record blanks. A resolution adopted by the committee asks the members of the association to use these rail statistics blanks for reporting and compiling information relative to rail failures and rail service. Compliance with this request by association members will give the committee a great mass of statistical information on rail service that must be studied and digested. The committee therefore has a task of no small magnitude confronting it, and needs to devise plans for making efficient use of the data thus secured. The Harriman Lines have had in effect for some time a plan for doing this very thing, and Mr. Isaacs, consulting engineer of these lines and a member of the rail committee, gave at the meeting of this committee, held in Pittsburgh, October 5, an outline of the methods followed on his system. A part of this paper is reprinted elsewhere in this issue. The scheme involves only two report forms, and when modified as mentioned in the paper, it is thought these forms will give all of the information necessary or desirable to be included in statistics of broken or failed rails. This information is tabulated, and also worked out in graphical form, for each six months; it also is intended to make yearly records for all years back to and including the initial year. In drawing conclusions the data is studied under six heads, as follows: (1) Effect of weather; (2) life; (3) character of failures; (4) chemical characteristics; (5) the manufacturers; (6) service performed. The plan has not been in effect long enough to draw definite conclusions and the data given in the paper was not presented with this intention, as already mentioned; it was merely to outline the method. However, some interesting deductions may be made, and the facts already obtained, as well as the methods used, are worth careful study.

THE FISCAL HOROSCOPE OF THE RAILROADS.

A prominent Western railroad manager says: "Restrictive legislation has so deprived us of the power of initiative that it has set the country back five years." Quite likely that is a fair guess, as regards certain sections. Possibly the whole country may be five years in getting all of its activities back to the high speed of 1907; but not all of the trouble could be charged to legislation, of course. Moreover, low speed is in some respects good for us; though it would be pleasanter if the punishment could be administered by a wiser and kindlier power. But whatever may be the fate of our guesses, there is one practical question connected with the relation of the state to the railroads concerning which most of our legislators seem still to be as persistently obstinate as ever—the question of how to punish a corporation without punishing the individuals who compose it. The question is, of course, unanswerable: the thing cannot be done. But our law makers' minds keep right on in the same channel, just as though it could be done.

The railroads of the land may be said to sustain four great armies. There is the army of stock and bond holders whose dividends and interest money form the individual income that supports so largely the retail trade; there is the army of railroad operators; there is another army of railroad shopmen, and there is the greater army of factory, forest and mine workers who turn out the railroad supplies. As an element in any general business situation, good or bad, the railroads,

if not fundamental and first, are very near that place. Their monthly returns of traffic are justly reckoned the most trustworthy index of business conditions, for they denote not merely the amount of railroad business done, but the amount of commodities produced and marketed. Bank clearings, the reports of mercantile agencies and the like, have, of course, their own tale. But nothing like the railroads so closely touches the vital trade of the country of which they are at once creators and expounders.

It is a great misfortune of the present business depression that this vast railroad interest has been forced, chiefly by external causes, into conditions which differentiate it from other great industrial branches. The farm, the factory and the mine each are a law unto themselves, and where subject to statutory law the statute is protective, cherishing and stimulative. But the railroad, as a public service branch, so far from being a law unto itself is, legislatively speaking, the target of the law which, far from being protective, has been restrictive and depressing. The railroad is now and has been for a year or two in the position of a man who, in sickness, should find that the law had forbidden him to call in the doctor; nay, worse yet, to even avail himself of the healing power of nature. The farmer can shift his crops, reduce cultivated acreage, or sell his farm and move away; factory and mine can curtail, cut wages or shut down, and even the merchant can in some considerable degree readjust his business to conditions. Not so the railroad. It must not only operate, but it must operate under fair conditions of public convenience and safety with a plant immutably fixed. These conditions alone make it hard for the railroad to meet the contractive process of hard times. It becomes immeasurably harder for the railroads when, as now, what may be called "politics" in both a narrow and broad sense deny them the natural expedients of recovery—notably, reduction of wages.

Looking at the situation with wider vision the noun "contraction," at once a term of pain and of cure, becomes a kind of key word. Has contraction, following last year's panic, reached its limits or is it to go on? Are we on the verge of a rebound, or in the early stage of a "long drag" like that which for five years followed the panic of 1873? The optimist and the conservative each has his plausible line of reasoning. The optimist tells us of enormous crops; of a business revival slow but steady; of decrease of idle cars on the railroads; of empty shelves that await goods when the moment comes to buy them, and of the final weeks of a Presidential campaign to be followed by a temperamental change at Washington, with modified, if not reversed, methods. Conservatism, in casting its fiscal horoscope, accentuates the persistence of decreased railroad earnings as compared with 1907; admits a certain contraction, but asserts that the solid basis will not be reached until it affects commodities and wages, including those of railroad employees; calls attention to tariff revision as a disturbing factor after the Presidential election, and declares that artificial interference with the natural law of recovery—by the federal government, the combined trusts and organized labor—must protract the hard times; that the malady will not be cured until that law is allowed its swing. Optimism accentuates the resources of the country, its versatility of place and product, its quick aptitude for change. Conservatism, in its forecast of ways and means of emergence from hard times appeals to fiscal precedents and the outworking of economic law. The truth may, in fact, lie somewhere between.

But whichever theory is accepted as to the time and methods of the fiscal recovery of our railroads, there must at one point be a radical shift before recovery can be complete. The railroad has a double nature. It is at the same time public and private. In its public character it is called upon justly to do certain things. It must supply good service, and this at fair rates; be honestly financed, and be not only willing, but eager for financial publicity. But it has also its private side, represented by the railroad investor. Are not his dollars represented in railroad stocks and bonds entitled to at least the legal protection and the public respect that goes with the dollars placed in private venture? The very phrase "public service," as applied to investment, signifies greater risk. It means, as contrasted with the investment in factory, farm or shop, money both placed at long distance away from the individual eye and subject to far greater vicissitudes of legislation. It means also an investment far more beneficial to the public than the private one. In that sense it is more entitled to civic regard than the non-public dollar. But by a strange inversion of justice and reason, the investor's private dollar is protected while his public dollar is attacked. Expressed in another form, the public element in the railroad has crowded down and out the private element; nor will the railroad horoscope grow bright until the just balance is restored. If that readjustment depended on the demagogue, the politicians and the socialist, there might be foreboding. But, fortunately, the public service dollar in a hundred ways identifies itself, first or last, with the dollar of the people at large. It sometimes takes time to demonstrate the fact, but time in this case is on the side of the railroads, saying nothing of the restraining power of the courts and their ability to draw the line where anything like confiscation of the public service dollar begins.

FREIGHT CAR DEMURRAGE.

In 1887, 21 years ago, the first concerted action was taken by the railroads of this country for the enforcement of rules to prevent undue delay to freight cars. It is needless to recite the misuse of cars by shippers which made this action of the railroads necessary. Neither is it necessary to the present consideration of this subject to dwell upon the part which short-sighted railroad men, or those overborne by competition for traffic, had taken in the establishment of such bad practice on the part of shippers. There had been many efforts made by individual railroads to force a more prompt loading and unloading of cars, but, owing to the competition for traffic, and to the resentment of those who controlled it, such efforts usually ended in ridiculous failure.

The first demurrage bureau, then called a car service association, was organized by the railroads centering in Omaha, Neb. The spread of the idea was as rapid as its effectiveness was marked. Most of the more than 40 bureaus now in operation were organized prior to 1892.

The original purpose in forming the bureau was undoubtedly to obtain an increased car mileage performance. At the start, the injury to the would-be shipper through the misuse of cars by another shipper was not so fully understood as it is now. Neither was the full effect of the rules upon congested terminal tracks and switching expense clearly foreseen. A shrewd general manager, soon after the establishment of one of the earliest demurrage bureaus on his line remarked that, if he could have foreseen the full effect of the rules he could have saved to his company the expense incident to the ordering of a block of new freight cars and some yard engines. The railroads at that time sought simply to increase car mileage, and regarded all shippers as common opponents of this purpose, because of the shippers' well-nigh universal disregard of the delay to cars while loading or unloading.

The demurrage rules have revolutionized the mental attitude of all, both shippers and railroad men, toward delay to cars. The big shipper, apparently obsessed by his bigness, seems to think that the demurrage rule is a good thing in its general application, but that in his particular case the magnitude of the freight bills he pays should entitle him to exemption. At least, he says that there should be both wholesale and retail transportation rates and demurrage rules. That some railroad men see reason in his argument respecting demurrage rules, is indicated in what is called the average rule, now in force in some parts of the country. This rule recognizes that

the big shipper does not consider the carload as a unit of shipment, but is concerned, rather, in a certain number of hundreds of tons of raw material. It recognizes, also, that the big shipper or consignee has superior facilities for loading and unloading cars, and, therefore, needs less free time per car than the smaller shipper. The advocates of the average principle contend that there should be two demurrage rules throughout the country: first, the 48-hour rule, which allows the shipper whose conditions it best serves, two days' free time on each car, exclusive of the day of notice; second, the 24-hour average rule, applied to each month's business separately, which allows the shipper whose conditions it best serves, one day of free time on each car, exclusive of the day of notice, and credits him with as much of the one day per car as he does not use.

It is argued that these two rules fairly fit the conditions of all users of cars, and afford shippers the opportunity to work under the rule that effects the promptest release of cars with the least expense. The 48-hour rule is of general application. The 24-hour average rule is applied only under contract between shipper and railroad, as specified in the rule. While the 24-hour average rule allows less free time than any other demurrage rule so far applied or proposed, at the same time it affords the shipper with modern conveniences for loading or unloading and storing, an opportunity, by great diligence in the release of cars, which is of advantage to all, to work his freedom from demurrage penalties. In some sections where an average rule has been tried, which allowed a greater free time than 24 hours, the result has not been satisfactory, because the free time has permitted undue delay.

Opponents of the average plan contend that it permits a great delay to some special kinds of cars, because the penalty that would accrue under an individual car rule, for such delay, is offset by the release of other kinds of cars in less than 24 hours. This objection is answered by the proposal to put a clause in the contract, penalizing a delay to any one car beyond, say, seven days, regardless of the shipper's average record for the month.

The average rule advocate says his plan is scientific, fits the conditions existing in all parts of the country, and is open to the acceptance of all shippers. He says that what is usually called the industrial rule, an arbitrary allowance of 24 hours on each car, in addition to the 48 hours allowed for loading or unloading, which arbitrary allowance is made, nominally, for switching cars from and to an interchange track, is really designed to fit the conditions surrounding the big shipper, and is purely a class rule; that it only approximates the conditions it is said to fit. Its best friends admit that the additional time allowed to those shippers who do their own switching from and to an interchange track, is either more free time than is needed, or, since the additional time is allowed under an individual car rule, is so unadapted to the conditions governing that the big shipper is irritated by the penalty for delay to an occasional car, and from which he cannot escape by any extra effort he may make to promptly release the mass of his cars.

But to return to the changed mental attitude toward delay to cars. Now, the first thought that comes to the man receiving notice of the placing of a car for his use, is to "get busy." In most cases, probably, it is to avoid the penalty for delay. With a few it is due to a growing consciousness of the needs of commerce; their own interest and that of their neighbors. The benefit from this changed mental attitude is incalculable.

In the beginning of the demurrage bureaus the opposition of shippers when called upon to pay the penalty for undue delay to cars was almost unanimous. It was also acrimonious. Out of this grew many contests that were only settled in the courts of last resort. The national association of the demurrage bureau managers has compiled a book of legal decisions growing out of these contests. At first there was great fear in the minds of railroad officers and counsel, of the word "demurrage." Some ancient, and, therefore, honorable, legal decision proclaimed demurrage as applicable only to marine vehicles of transportation. Little by little, and at much expense, the railroads have established the law of railroad car demurrage. It is difficult now to find a shipper with the hardihood to contend against the right of the car owner to its prompt release. The opposition that formerly took that position has latterly spent itself in what are called, with a strange misconception of right names, "reciprocal demurrage" laws. These are but little heard of now, in the days when the authors of alleged reciprocity have no use for cars. They were never resorted to by many. Their only positive effect was to establish a little firmer the right of the car owner to collect reasonably for unreasonable delay.

Now we have a federal law and a federal commission that take cognizance of car demurrage, and so well established is the principle of demurrage that some railroad men who should know better are swinging to the extreme position that the demurrage rules will enforce themselves; they are like the soldier, who, forgetting the hard fight to gain the hill entrenched by the enemy, disbands his force, and is soon driven from his point of vantage. But there is an inexorable law that compels us to go forward or go back; there is no standing still in this world. Surely the intelligent traffic manager or solicitor knows that it would be unfair to himself and his agents who are charged with the duty of securing business to deprive them of the protection of the demurrage bureau. The abandonment of these bureaus would lead to such discriminatory practices as would force the Interstate Commerce Commission to establish the same means for close and impartial inspection of this department of railroading as is now furnished by the bureaus.

Mr. F. A. Delano, president of the Wabash Railroad Company, and president of the American Railway Association, in an address to demurrage bureau managers, recently, said:

"Every now and then a suggestion has been made that car service bureaus should be wiped out. The argument most frequently made is that we do not have to have a special man to see that our freight charges are properly collected; we do not have to have a special man to see that our switching charges are assessed and collected, and why should we have a special bureau to see that the car service charges are properly assessed and collected? On the other hand, I believe, and I think you will agree with me, that this is an age when all industries are hiring specialists; that the assessing and collecting of car service, for instance, is something that really requires the attention of high class men; attention by a lot of very good men. The difference now and formerly, it appears to me, is that you now represent not only the operating department of the railroads; but that you represent what you might call the whole railroad and all parts of the railroads, the business getting and business performing part of the railroads. Your duty has been a good deal widened; the difficulties have been a good deal increased and it behooves you gentlemen to see that you make yourselves indispensable and necessary to the railroads. It does not require a very high class of ability that will simply make rules and rigidly enforce them without regard to the rights of the people affected, the communities which make our laws, etc., but it does take high ability to frame fair rules and enforce them with intelligence.

"If we could print all our tariffs and enforce them as they are enforced on state operated railroads, we should not have to hire high class traffic men to solicit business. The reason we have to have such high grade men is that there is a constant warfare between the different railroads in competition with each other; that there is a constant effort to get the business of this shipper and that shipper; a constant effort to adjust commercial conditions on one road so that they will meet competition of another, and there is a good deal the same problem with the car service associations. The relations of the railroads as a whole to the communities, to the law, etc., are all complex and of vital importance. If we could simply make these rules and without regard to the other fellow, why we could have a first-class chief clerk run the business; but the reason we have to have men of higher caliber than that is that we have got to have men that keep in touch with the conditions and necessities of each community, and try to adjust the rules to the business necessities. If we do not do that, what are we going to have? We are going to have what we were rapidly coming to last fall when the country was struck by a financial panic—that is, state made regulations, reciprocal demurrage laws, etc., rules made by men who have very little technical

knowledge of the requirements of business or of the necessities of the railroads."

Before the enactment of the present federal law to govern transportation, some rules, like that of demurrage, might be safely honored more in their breach than their observance, and many men paid but little attention to demurrage rules. Now, when all published rules and tariffs must be observed, and active federal supervision is present or impending, many are finding demurrage bureaus embarrassing to their methods. It is not expedient to openly advocate the abandonment of all rules to protect cars from delay. Probably no one desires the entire abandonment of such rules on all cars; but it would better suit the methods of some if the open, impartial and active supervision maintained by the bureaus was discontinued. In other words, disband the force that has brought the demurrage rules to their present state of efficiency.

There are some railroad men, departmental chiefs or their subordinates, who seem to think that the abandonment of the bureaus will offer better salaries or better positions for themselves if the supervision of the demurrage rules is undertaken by individual railroads. These usually mask their real purpose by arguing the saving of expense for operation. They say nothing about the certain loss of effectiveness due to stress of competition and their inability to know just what their competitors are doing.

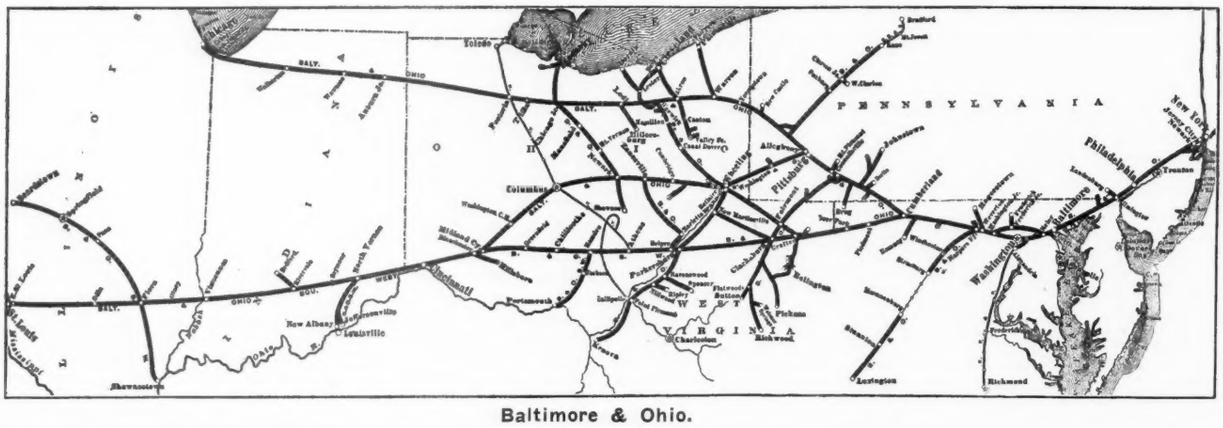
Certain other railroad officers, a much higher class, seem to regard the difficulty they are having to get some of their indifferent colleagues in the bureaus up to proper standards in demurrage, as a necessity for going it alone. They overlook the fact that it is the honest railroad that most needs the bureau. No one can withhold sympathy from the honest man, who, impatient of the selfish manoeuvring of some of his associates in a bureau, seeks to cut loose from them. His honest indignation is admirable; but his method is mistaken. It is the honest railroad company that, while faithfully living up to its rules, needs to know what the other fellow is doing. The bureau provides this information. There is no department of railroading in which crooked work can be so completely covered up as in the demurrage department, if close and impartial supervision is lacking. The honest application of the rules depends upon correct car records, and they can be assured only by close and constant inspection. The honest road can, of course, organize a bureau of its own to make such close and constant inspection, but it can exercise no authority over the other kind of road, and cannot even know what the other fellow is doing. Even if the wrongdoing is detected, the information thus acquired cannot be used without turning informer, either to the management of the offending road or to the government; with the result that such action will be used against the informer in the solicitation of competitive business.

Again, the bureaus are worth all they cost for the handling of complaints from shippers, and the adjustment of claims. Without the bureaus each road would be without evidence to meet the arguments of claimants that liberal interpretation of the rules was given by other roads. Such a situation would offer the strongest inducement for shippers to combine in claim bureaus, for the conquest of weak-kneed railroad officers. Such bureaus would certainly be in position to know more of what different roads were doing, than would any one of the roads.

Co-operation of the railroads in demurrage bureaus is essential to the efficiency of the rules. The shipper who seeks a fair field, and no favor as against some other shipper, should know this. Furthermore, the managers of such bureaus should be fully empowered to interpret the rules alike for all within their jurisdiction, and their decisions should be overruled only by the representatives of all the roads for which they act, or by some court or commission of competent jurisdiction. Fortunately for the railroads of the country the Interstate Commerce Commission has declared itself in favor of the impartial enforcement of strict demurrage rules.

BALTIMORE & OHIO.

The Baltimore & Ohio is a road which has handled a great volume of traffic at a narrow margin of profit in the past. Last year its showing was an excellent example of such a road, face to face with a heavy decrease in the volume of traffic without any proportionate decrease in the cost of labor and supplies or increase in the return per ton per mile or per passenger per mile. But the Baltimore & Ohio is also an example of a road which through efficient operation and conservative policy on the part of the directors in the payment of dividends in the past, has accumulated a very large surplus credited to profit and loss, this amount being $19,739,542 on June 30, 1907. This surplus has, of course, been invested, in great part, but it stands as a sum actually earned on the common stock.



Baltimore & Ohio.

The Baltimore & Ohio did not earn sufficient to pay 6 per cent. on its common stock during the past year, but the directors showed their appreciation of the equity of the common stockholders by declaring the regular dividend and paying part of it out of the accumulated surplus.

In the general returns made by the Baltimore & Ohio there is nothing of unusual interest. The gross earnings were $73,608,781 last year as compared with $82,243,922 in the previous year, a decrease of $8,635,139, or 10 per cent. The net earnings were $19,457,902 in 1908 as compared with $27,363,831 in the previous year, a decrease of $7,905,930, or 32 per cent. The character of the traffic carried by the road explains at once the disproportionate decrease in net earnings. The facts, well known to any one who is familiar with the Baltimore & Ohio, are that it has in recent years carried its freight traffic at a very low rate, and that its earnings have been due to strict economy in handling this traffic, and to conspicuous skill in management.

Conducting transportation cost $27,763,097 in 1908 as compared with $27,891,035 in 1907; a decrease of $127,938. Maintenance of way per mile operated cost $2,728 last year as compared with $2,732 in the previous year. Some of the expenditures in which the company did not economize were: Bridges, trestles and culverts, on which $1,097,158 was spent last year, an increase of $304,092; and loss in damage to freight, on which $821,088 was spent last year, an increase of $159,713. On the other hand, the following table gives the principal accounts in which the company was able to make considerable saving:

Accounts.	1908.	Decrease.
Maint. way and structures:		
Rails	$531,431	$355,174
Other track material	542,735	108,253
Buildings, fixtures and grounds	646,784	176,188
Maintenance of equipment.		
Freight train car repairs	5,037,358	185,463
Transportation expenses:		
Yard conductors and brakemen	1,800,342	185,400
Fuel for yard locomotives	664,319	102,287
Road enginemen	3,830,967	145,935
Fuel for road locomotives	4,193,473	159,571
Road trainmen	4,010,961	134,119

Thus it will be seen that the only two places where the company could make any gains to speak of were in the maintenance of equipment and in the wages of the operating force. The maintenance of equipment account, however, shows an increase in the total under this head of $114,880, largely on account of the new depreciation account prescribed by the Interstate Commerce Commission.

Unit costs of repairs of equipment were as follows: Per locomotive $2,915 in 1908, as compared with $2,924 in 1907; per passenger train car $946 as compared with $972; per freight car $84 in both years. This is on a basis of equipment owned at the beginning of the fiscal years and since it does not include renewals or depreciation is liberal.

Freight traffic statistics show that the number of tons carried one mile last year was 9,787,415,333, a decrease of 16 per cent. compared with the previous year. Soft coal formed 44 per cent. of the tonnage carried one mile, its ton-mileage being 4,304,805,841 last year, a decrease of but slightly over 4 per cent. It is due largely to this soft coal business that the Baltimore & Ohio did not show more serious losses, both gross and net, last year than was actually the case. The most noticeable fact about passenger traffic statistics is that earnings per train-mile were but 117.87 cents last year, a decrease of 7.94 cents, or more than 7 per cent.

There were few changes in the character of commodities carried. Coke, which reflects as well or better than any other commodity the business depression last year, furnished but 3,679,792 tons, a decrease of 2,191,983 tons from the previous year. Castings and machinery, whose tonnage also quickly responds to business depression, decreased from 4,387,250 tons last year to 2,960,531 tons.

The balance sheet shows the company in a very strong position financially. Cash on hand amounted to $13,955,494 on June 30, 1908, an increase of $8,041,116 over the same date, 1907. There is the sum of $14,988,318 due from the B. & O. Equipment Co., carried, rather questionably, as a current asset. In current liabilities appears the item of $11,666,000 loans and bills payable, not shown on the balance sheet of June 30, 1907. This is explained by the issue of $3,666,000 B. & O. one-year notes dated March 1, 1908, the proceeds being used to buy preferred and common stock of the Cleveland, Lorain & Wheeling; $6,000,000 B. & O. one-year notes dated March 2, 1908, and a loan of $2,000,000 from the United States Trust Co., New York.

On October 27, 1907, the passenger service at Washington, D. C., was transferred to the new terminal station. During the year the company subscribed for $500,000 additional stock of the Washington Terminal Co., making its total holdings $1,750,000.

When prosperity returns, and car shortages instead of car surpluses are again the rule, the Baltimore & Ohio will be one of those companies whose management of its property during a year of depression has left no load of neglected maintenance expenditure to be paid for before it can handle a full share of the new traffic.

The following table shows the results for the last two years.

	1908.	1907.
Average mileage operated	3,992	4,006
Freight revenue	$55,681,786	$64,208,671
Passenger revenue	13,736,107	14,121,897
Total operating revenue	73,608,781	82,243,922
Maint. way and structures	10,892,062	10,944,598
Maint. of equipment	12,584,073	12,993,723
Traffic	1,669,405	1,653,081
Conducting transportation	27,763,097	27,891,035
Total operating expenses	54,150,879	54,880,091
Taxes	2,027,299	1,759,795
Net operating revenues	17,430,603	25,604,036
Gross income	21,785,346	29,639,052
Net income	10,435,344	18,561,302
Dividends	12,030,888	10,529,831
Additions and improvements	278,556	4,115,672
*Surplus	1,874,100	3,915,799

*Deficit in 1908.

ST. LOUIS SOUTHWESTERN.

The St. Louis Southwestern, as its trade name, the Cotton Belt route, implies, depends largely for its revenue on crop conditions. Its poor showing in gross revenue last year as compared with 1907 may be explained by the poor cotton crop and by the enforcement of the 2-cent fare laws enacted by the legislatures of the states of Arkansas, Missouri and Illinois, and by various reductions in freight rates prescribed by state commissions. In the first case the St. Louis Southwestern has a private hardship of its own, while in the other cases it suffered in company with many other railroads. The increase in operating ratio from 68 per cent. in 1907 to 78 per cent. last year is due partly to the fact that 1907 showed a much lower operating ratio than any year since 1901, and more directly to the general business depression; in some part also to the new methods of accounting prescribed by the Interstate Commerce Commission. The St. Louis Southwestern hauls cotton and agricultural products from Texas and the South, northeast to St. Louis, and hauls merchandise and manufactures from St. Louis south. Last year its northbound tonnage was 53 per cent. and its southbound tonnage 47 per cent. of the total; while in 1907 the ratio remains nearly the same; so that notwithstanding a poor cotton crop the business depression which would naturally affect this southbound haul was as detrimental to economy in handling the traffic as would be the case where the character of the traffic hauled north much the same as that hauled in the opposite direction. This is strikingly illustrated by the fact that while the average train load decreased by 6 per cent., the percentage of empty car miles to the total increased over 33 per cent.

Gross revenue from operation was $9,599,619 last year, a decrease of 7 per cent., while operating expenses were $7,502,595 in 1908, an increase of 7 per cent. over 1907. Of this amount $331,971 is due to charges for depreciation on equipment, in accordance with the rules prescribed by the Interstate Commerce Commission, no such depreciation charge being made in 1907.

The number of passengers carried last year amounted to 2,261,965, an increase of 184,883, or nearly 9 per cent., but the average distance each passenger was carried last year was but 38 miles, a decrease of a little less than 5 per cent.; and the average receipts per passenger per mile was 2.19 cents last year as compared with 2.42 cents in 1907, a decrease of almost 10 per cent. Thus the total passenger revenue was $2,275,185 last year, a decrease of over 5 per cent. The revenue from freight decreased even more, the sum received for this service being $7,175,799 last year, over 7 per cent. less than in 1907. This is accounted for by a falling off in the total number of revenue tons carried of 4 per cent., the tons carried last year totaling $2,944,168, and by a falling off in receipts per ton per mile of nearly 4 per cent., the sum received last year being 1.01 cents.

Operating expenses were $7,502,595, but beyond the fact

that the maintenance of way and structures was as ample last year as it was the year before, it is hard to make any accurate detailed comparisons of expenses between the two years. As given in the annual report for 1908, conducting transportation took $3,368,238, or 35 per cent. of total operating revenues, while traffic expenses took $345,762, nearly 4 per cent. of the total revenues. In the 1907 report conducting transportation took $3,707,592, or 35 per cent. of total operating revenues, and included in this account were expenses charged last year to traffic; so that seemingly conducting transportation expenses absorbed 4 per cent. of revenues more in 1908 than in 1907. Maintenance of way and structures cost on an average $1,358 per mile of main track last year as compared with $1,308 in the previous year. This is on a basis of 1,326 miles of main track last year and 1,310 miles in the previous year. The character of the road is shown by the statement that 824 miles of main track were laid with 75-lb. rails and only about nine miles with 85-lb. rails, while 423 miles were laid with 56-lb. rails. Of this main track 347 miles were ballasted, 175 miles having rock ballast, and the majority of the rest gravel and sand, while 438 miles were unballasted.

The tax assessors in the states through which the St. Louis Southwestern runs were not to be discouraged by decreased earnings and increased expenses of railroads, and we find the taxes last year equaling $293,786, or over 3 per cent. of the total operating revenue. This in a year when the company already had many hardships to contend with is an increase of 21 per cent. over the taxes in the previous year.

Unit costs of repairs of equipment were as follows: Per locomotive $2,192 in 1908 as compared with $2,071 in the previous year; per passenger car, including official cars, $739 as compared with $706; per freight and work car, $72 as compared with $71. These are ample figures and show that notwithstanding decreases in revenue, the policy of the company has been to maintain its property at the expense of net income.

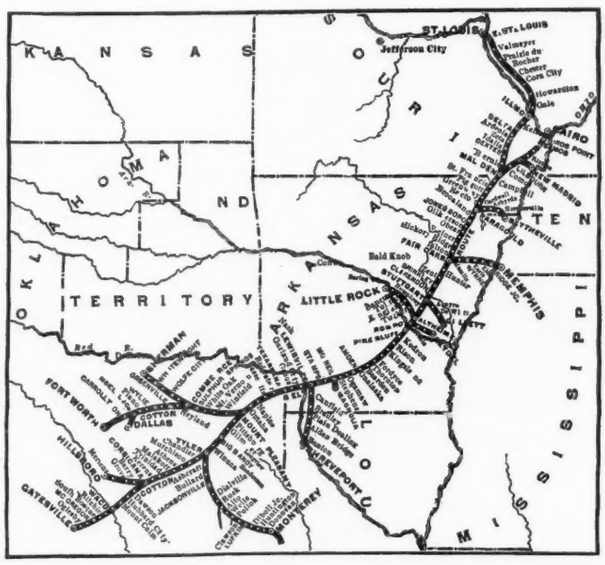
During the past 17 years $10,365,792 has been spent for additions and betterments to property, of which $5,956,890 was charged to income and $4,251,144 was received from the sale of first consolidated mortgage bonds. The remaining $157,758 is at present unfunded but charged to capital account. Previous to 1906 nearly all additions and betterments were charged to income account, only $1,094,142 being charged to capital account. During the last three years, however, no additions and betterments have been charged to income account, the greater part of the sum spent under this head having come from the sale of first consolidated mortgage bonds.

The balance sheet shows $3,147,800 of these first consolidated 4 per cent. mortgage bonds held in the company's treasury and unpledged, and a total of but $4,744,550 of all classes of bonds, including the first mortgage fours held in the treasury and unpledged. As no more bonds may be issued under any of the existing mortgages, the St. Louis Southwestern would seem to show the need of some comprehensive plan for financing future additions and extensions. This need, however, does not seem to be at all pressing. Current assets on June 30 amounted to $4,883,208, excluding $1,215,325 supplies on hand, while current liabilities were carried as $4,042,153. Included in current assets is $1,369,229 cash on hand, an increase of $580,485 over the sum shown June 30, 1907.

The character of the freight carried shows astonishingly wide fluctuations from year to year. As has already been mentioned, on account of poor cotton crop the tonnage of this product decreased last year, being 101,363 tons, a falling off of 43 per cent., and cotton seed and its products furnished but 98,291 tons, a falling off of 42 per cent. On the other hand the tonnage of fruit and vegetables was 67,908, an increase of 35 per cent. The very marked decrease in the tonnage of wheat carried during the last three years indicates that farmers in the southwest are no longer finding this crop as profitable as others. The wheat tonnage decreased 27 per cent. in 1907 from the figures of 1906, and again decreased 36 per cent. last year from the figures of 1907. The tonnage of ore, bullion and ore products increased 127 per cent. in 1907 over the previous year, and decreased 42 per cent. last year from the figures shown for 1907. Notwithstanding this decrease in tonnage of ore the tonnage of products of mines increased last year 19 per cent. over 1907, the increase being principally due to an increase of 20 per cent. in coal and coke and 36 per cent. in stone; the tonnage of these two commodities last year being 197,685 tons and 136,013 tons respectively.

A. H. Britton, Vice-President and General Manager, in his report sums up the case of not only his own road but of most roads operating in that section of the country in the following paragraphs:

"Railroads are the largest employers of labor and consumers of material, and the cost of both has advanced very substantially in the past decade, as has also the amount of taxes paid; on the other hand the price received by carriers for transportation (the commodity they have to sell) has continuously decreased, and in the face of these well



St. Louis Southwestern.

established facts, the carriers are clearly and justly entitled to an increase in revenue sufficient to enable them to pay fair wages to employees, maintain the property so as to admit of its safe and economical operation and yield a proper return on the investment. It is hoped that the active anti-railroad agitation of the past few years, resulting in the impairment of the credit of transportation interests, will in time be followed by a reaction which will establish closer relations and a better feeling between the railroads and the people. The demands of the public are for safe, prompt and efficient service. To meet these demands and to properly develop the Southwestern states, increased rather than decreased transportation facilities are necessary.

"These results, desired by the railroads and the public alike, can only be obtained by reasonable increases in freight and passenger rates.

"Arbitrary rate reductions and antagonistic legislation are bound to enforce rigid operating economies, a curtailment in expenditures for improvements and the consequent continued idleness of many employees, with possible reductions in the wages of those retained in the service."

The following table shows the results for the last two

years, figures for 1907 being given only in cases where the company has rearranged them to correspond to the form in use since June 30, 1907, prescribed by the Interstate Commerce Commission:

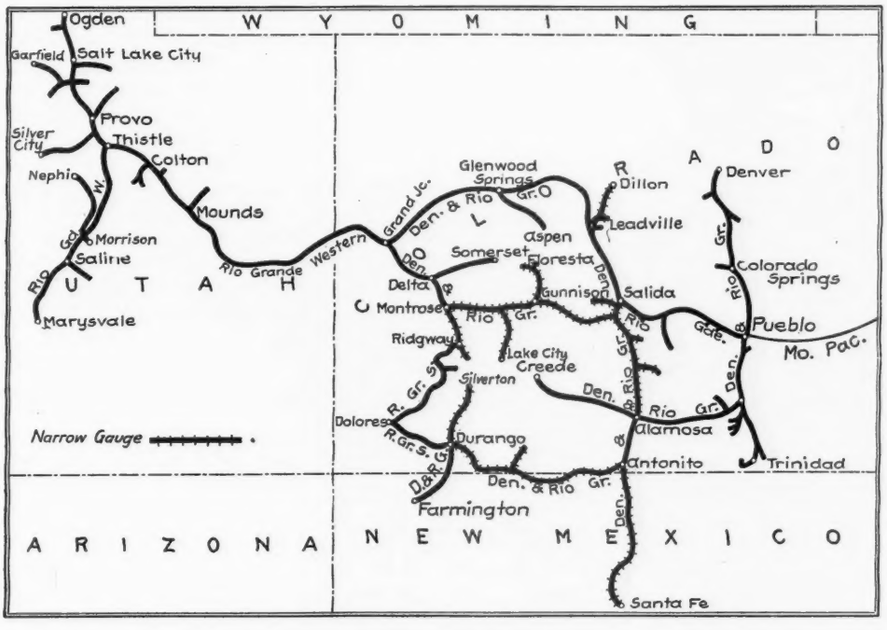
	1908.	1907.
Average miles operated	1,464	1,452
Freight revenue	$7,173,799	$7,726,985
Passenger revenue	1,896,746	2,016,783
Total operating revenues	9,599,619	10,276,432
Maint. way and structures	1,801,026	.....
Maint. of equipment	1,583,778	.....
Traffic	345,762	.....
Transportation	3,368,238	.....
Total operating expenses	7,502,595	7,004,348
Taxes	293,786	243,501
Net revenue	1,803,220	3,028,581
Gross income	2,448,119	3,568,357
Net income	450,244	1,712,542
Dividends	130,420	130,420
Surplus	319,824	1,582,122

DENVER & RIO GRANDE.

Whatever the opinions as to the immediate earning power of the Western Pacific, which is now being built from Salt Lake, Utah, to San Francisco, Cal., by the same interests that control the Denver & Rio Grande, and by direct aid from the D. & R. G., there can be no two opinions as to the value of the new road to the Rio Grande. With the Missouri Pacific connecting it with the east, and the Western Pacific giving it an outlet to the Pacific coast, the Denver & Rio Grande may look for increases in traffic which will test its carrying capacity to the utmost. Not only will the amount of traffic of the road be greatly increased, but the average length of haul of each ton should be considerably longer. In the past something like 80 per cent. of the tonnage carried has been mines and mineral products largely, probably, from Colorado, each ton of which had a relatively short haul over the Denver & Rio Grande; but when this road becomes a connecting link for Gould traffic between the manufacturing centers of the east and the Pacific coast, not only should it retain all the local traffic which it now hauls, but it should very greatly increase its through freight, which will give it a haul extending nearly the entire length of its main line from Denver to Salt Lake.

The question then will be one not of getting traffic but of handling it. The road has heavy grades, sharp curves and magnificent scenery, none of which qualify it to handle economically a great volume of freight. This does not mean to imply that both gross and net earnings should not increase with the increase in traffic, but simply that, as the road is now situated, this increase in gross and net can be by no means unlimited. There is another road, the Denver, North Western & Pacific, generally known as the Moffat road, projected from Denver to Salt Lake, and of which 185 miles is now in operation from Denver west nearly to Steamboat Springs. The portion of this road already built and its projected route give it a line between Denver and Salt Lake, low grade and straight, compared with the Denver & Rio Grande. Should Gould interests acquire this road, put it through, and use it as the heavy freight route for D. & R. G. traffic, the problem would be simplified.

The Denver & Rio Grande has made wonderful progress during the last 12 years, and although its gross and net earnings both fell off during the past year owing to the general business depression, it has many things to be thankful for. It has suffered from the lack of any general and comprehensive plan for the future issue of securities, especially during the last few years since it has assumed the burden of guaranteeing the interest on Western Pacific securities and of financing the road to the extent required, in addition to the $50,000,000 raised on Western Pacific securities. Since the close of the fiscal year ended June 30, 1908, stockholders have voted to consolidate the Rio Grande Western and the Denver & Rio Grande into a new Denver & Rio Grande Railroad Company, and they have also voted to authorize the issue of $150,000,000 first and refunding mortgage bonds, $90,000,000 of which are to be reserved to retire prior liens. Of the bonds secured by prior liens the first do not mature until 1928; others maturing in 1936, 1939 and 1949. Notes to the amount of $10,000,000 secured by a block of the new bonds have been sold to provide funds for the completion of the Western Pacific. The far-sighted scheme of the first and refunding mortgage has put the Denver & Rio Grande in a much better position financially than are most of the Gould roads.



Denver & Rio Grande.

During the past year total operating revenues were $20,386,431, a decrease of 2.5 per cent., while operating expenses were $13,038,809, a decrease of less than 1 per cent.; thus, the operating ratio was 62 per cent. in 1907 and nearly 64 per cent. in 1908. Freight earnings were $14,369,567 last year, a decrease of $774,749 from the previous year. On the other hand, passenger earnings were $5,119,190 in 1908, an increase of $272,954 over 1907. Maintenance of equipment and transportation expenses decreased, the decrease in the latter, however, being only $5,804, making the total charged to this account last year $6,729,470. The maintenance of way and structures cost $883 per mile of road operated as compared with $970 in 1907. In maintenance of way and structures there was spent the sum of $459,661 for ties last year, an increase of $157,530. Road enginemen were paid $1,223,096 last year, a decrease of $73,054, and road trainmen were paid $1,195,286, a decrease of $64,800. The decrease in the number of accidents is indicated by the fact that but $87,172 was spent on account of injuries to persons, while $131,963 was spent on this account in 1907.

Unit costs of repairs of equipment for 1908 were as follows: $2,376 per locomotive, $466 per passenger train car, and $78

per freight train car. Comparison with 1907 is misleading because of the changed form of this account prescribed by the Interstate Commerce Commission. When one considers that 795 miles of the total 2,499 miles of road is narrow gage, the maintenance of way figures are not high, but seem ample while the equipment figures are liberal.

Traffic statistics show that while freight revenue per mile of road operated decreased from $6,058 in 1907 to $5,750 last year, the revenue per train-mile increased from $3.16 to $3.27; and the average train load increased from 236 in 1907 to 247 tons last year, and the haul of each revenue ton decreasing from 129 miles in 1907 to 117 miles in 1908. The company received .08 cents per passenger-mile more last year than in 1907, making the average revenue 2 cents last year. The average number of revenue passengers per train increased by four, being 68 last year, and the average haul of each passenger also increased, being 126 miles as compared with 122 miles in the previous year.

The classification of freight tonnage is particularly to be commended for its frankness and the completeness with which the comparisons are worked out in the annual report. The company has not found it practicable to revise 1907's classified revenue, so that while the revenue from each class of freight is given as well as the tonnage, the comparison between the revenue last year and in the previous year may not always be correct. The tonnage of products of mines (bituminous coal and precious ore being together more than half of this tonnage) is 82 per cent. of the total tonnage carried last year as compared with 80 per cent. in 1907. The revenue from this source was $7,499,050 last year and was 52 per cent. of the total freight revenue as compared with 50 per cent. in the earlier year. The tonnage and revenue from all other classes of traffic decreased, as might be expected in a year of general business depression.

There was spent during the year under the head of betterments, $564,037, of which $332,644 was charged to the betterment fund and the remainder charged against income. Of the sum spent on betterment, $142,239 was spent for additional track facilities between Florence, Colo., and Canon City, and $157,466 for additional track facilities between Minturn, Colo., and Tennessee Pass. About 8,900 tons of 85-lb. rails were laid, replacing rails of lighter weight, nearly all on the main line of the Rio Grande Western. Out of the income of the previous fiscal year there were bought 500 steel underframe 40-ton gondola cars, 250 steel underframe coal and coke dump cars, and one Bucyrus steam shovel, all standard gage, at a cost of $761,497.

The balance sheet shows that while on June 30, 1908, the company had cash on hand of but $1,466,746, not a very large working capital, it had no floating debt, and a balance of current assets in excess of current liabilities amounting to $8,341,860. These figures, in the light of the recently adopted plan for future financing, indicate that the company is in a very comfortable financial position.

The following table gives the operating results for the last two years, the figures for 1907 having been rearranged to correspond with the classification prescribed by the Interstate Commerce Commission:

	1908.	1907.
Miles operated	2,499	2,500
Freight revenue	$14,369,567	$15,144,316
Passenger revenue	5,119,190	4,846,237
Total operating revenue	20,386,431	20,926,690
Maint. way and structures	2,207,697	2,425,446
Maint. of equipment	3,168,744	3,035,777
Traffic	444,950	387,247
Transportation	6,729,470	6,735,274
Total operating expenses	13,038,809	13,042,333
Taxes	750,471	730,387
Net operating revenue	6,597,151	7,153,970
Gross income	7,194,300	7,683,929
*Net income	3,535,836	4,176,797
Additions and betterments	231,393	1,525,000
Dividends	2,408,070	2,406,853
Surplus	896,373	244,944

*Income from all sources after the deduction of fixed charges and rentals.

NEW PUBLICATIONS.

Methods of Earthwork Computations. By C. W. Crockett, New York: John Wiley & Sons. 114 pages; 6 in. by 9 in.; 90 illustrations. Cloth. Price, $1.50.

The author, who is professor of mathematics and astronomy at the Rensselaer Polytechnic Institute, has developed in this book a number of exceedingly interesting formulas for the calculation of earthwork, based upon the fundamental prismoidal formula for such work. This prismoidal formula gives more accurate results than that using an average of the end areas only, which effects so great a saving in labor as compared with that of the prismoidal formula, as usually employed, that it is ordinarily used. It is the purpose of this book to explain a method by which this labor may be greatly reduced and the more accurate results, which are, however, only approximate at best, may still be obtained. The method is based upon an adjustment and equalization of values, by which by the simple addition and multiplication of those obtained directly from the level book, the same result as that given by the prismoidal formula is obtained. Unfortunately, each case must be treated separately and a formula obtained that will be applicable to it. For example, it is very evident that, where three levels are given at each station, the combination will be different from that where five have been taken. In either case the formula is too long to be remembered, and the main value of it lies in its suggestiveness, so that, when thoroughly grounded in the principles, the engineer can work it out readily if he chooses. It is questionable, however, whether, in all cases there would be a saving in time as compared with the use of the prismoidal formula as usually employed. And all along it must be borne in mind that only approximate values can be obtained.

There are a number of general rules given; but, in estimating their value for practical work, the ability or inability to remember must be kept in view. Had the book been provided with a descriptive index, its value for reference would have been greatly increased, for then it would have been possible to turn to any form of prism or formula that might have been desired, without the laborious search that would now be necessary.

As an example of the rules, take one picked out by chance, for the determination of the contents of a section, three levels taken, with ground surfaces warped and the roadbed of constant width, in cut. The rule reads: "(a) Multiply the sum of the four side heights by half the width of the roadbed, and the product by ¼ the distance between stations; (b) at each end, to twice the center height (depth of cut) at that end add the center height at the other end, and multiply the sum by the sum of the distances out to the side heights at the first end, and multiply the product by 1-12 the distance between stations; (c) add the results of (a) and (b)."

While this is an interesting example of mathematical juggling, it is difficult to see wherein any great saving in time or labor is obtained in comparison with the ordinary methods. Still it is always well to make a record of such possibilities as these and so these formulas and the principles upon which they are based have their uses, and the book will be correspondingly valuable to those interested in this character of work.

Locomotives a Vapeur. By Joseph Nadal. Paris: Octave Doin. 320 pages; 5 in. x 7 in.; 76 illustrations. Cloth. Price, 5 francs.

This small book on the steam locomotive is part of a scientific encyclopedia, and deals with the characteristics of present locomotive practice in France. It does not go into the discussion of the problems that enter into locomotive construction, but is purely encyclopedic in form in that it confines itself almost exclusively to what is being done, and has little to say regarding the reasons for doing it. Contrary to the usual manner of making books on these subjects in this country, this one was written by a man actively engaged in railroad service. M. Nadal is an engineer connected with

the motive power department of the State Railroads of France. The natural result is that the book deals almost exclusively with French practice, and to those who can read the language and wish to post themselves on what is being done there, this book will be found to be very valuable. It enters into rather minute details as to the material and forms that are used, and occasionally gives the reason for the same. There are frequent allusions to English and American practice for the purpose of calling the attention of the native reader to outside work.

In the closing chapters there is an attempt to make a mathematical analysis of the stresses set up by nosing and galloping, that is interesting if not conclusive to those who are familiar with the wide variations in theory and practice as developed in the United States.

Of course no part of the subject can be treated exhaustively in a book of this size, but to those who wish to get an insight into French practice, there is no way in which it can be obtained more readily and easily than in this book, for the statements are put in a way that is very interesting and with an evident familiarity on the part of the author with the subject in hand.

Hydro-Electric Developments. By Preston Player. New York: McGraw Publishing Co. 68 pages; 5 in. x 7 in.; 3 illustrations. Cloth. Price, $1.00.

This is undoubtedly an era of water-power developments both large and small, and the schemes devoted to them are without number. In cases where it is a question of large development, the interested parties will usually call in a competent force for consultation and incur the corresponding expense. But there are many cases of powers of moderate size where the promoters are handicapped by the two-fold disability of lack of cash and of experience, and where information regarding the methods to be pursued as outlined in this book will be of great value. Under existing conditions many water powers have undoubtedly been developed without giving sufficient consideration to the subject, and it is the object of this book to indicate, as far as possible, the information which should be obtained in order to afford a definite basis for forming a decision as to the merits of any proposed undertaking.

The method laid down is scientific and therefore thorough. It suggests that certain preliminary determinations be made at the outset, as to what the property is and for what price it can be bought, and then when the matter is offered to the banker or investor, the question of the rights acquired by the promoters are to be investigated as well as the market for the energy that may be developed and the cost for delivering the same.

The method of procedure suggested is that all the rights of the vendor be carefully investigated, this to include his acquired rights, the property involved, financial condition, together with a settlement of the basis for the management of the property. This, of course, includes an engineering examination of it.

The book deals not only with the general financial plan to be followed in the development, but also with central station economics, from the standpoint of the management and not from an electrical or mechanical one.

In the chapter on the sale of the energy there is a careful discussion of what a company can and cannot afford to do: to whom it is profitable to sell the energy and the basis for the prices that can be obtained. In this the effect of peak-load on the original investment is considered and its influence on the general scale of prices.

When, however, the minimum flow of water is less than that required for the development of the desired horsepower, the matter of secondary powers has to be considered, including storage and the possibility of raising the minimum development above that corresponding to the flow. Then comes in for consideration, as well, the advisability of assuming the business risks of incurring damages that may not occur more than once in 20 years, and for which an insurance fund must be provided.

The book closes with a chapter on capital costs, and deals with the natural losses in transmission between the power house and the consumer, the gross revenue to be expected and the cost of rendering the service, and concludes with a brief statement of the advantages of a water-power development from the standpoint of the investor.

Digest to Decisions under Act to Regulate Commerce, 1887 *to* 1908. By E. B. Peirce, Commerce Counsel, Rock Island-Frisco Lines, 1205 pages; 6¾ in. x 9⅝ in. Chicago: E. B. Peirce. Law buckram. Price, $6, and express charges.

This volume, which has been both prepared and published by Mr. Peirce, is more than its title imparts. Mr. Peirce felt keenly in his practice the need of a reference work relating to the entire interpretation and administration of the Act to Regulate Commerce. This need has not been felt by lawyers alone during the past two years, but by railroad traffic men, members of the state and interstate commissions, shippers, students of and writers on railroad subjects—in fact, by all who are interested in railroad traffic matters, the number of whom has within recent months very greatly increased. The author, with a large practical experience to guide him, set out to prepare a work that would meet the needs of all these various classes of people, and he has done his task with a skill, comprehensiveness and thoroughness that merits all praise, making not merely a digest but both a digest and an encyclopedia of interstate commerce matters. The present and future editions of the volume will be indispensable to the library of every concern and individual that is engaged or interested in interstate commerce.

Every interstate commerce case that has been decided by the Commission or the courts since the passage of the original Interstate Commerce act is covered by the digest, and every point made in each decision is stated, whether such point was or was not necessary to the decision of the case. The table of cases covers 23 pages, and after the title of each case are given a complete history of its disposition by the Commission and by every court that passed on it and references to where digests and the complete decisions may be found. Commodity headings have been inserted in alphabetical order so that the reader can refer to the name of any commodity and get data regarding every decision affecting its transportation that has been rendered. Under the head "Localities," all the localities that have been affected by decisions are given, with references to cases, this part of the volume filling 27 pages.

The book will be found very useful by those having the reports, and at the same time is so complete that those without the full reports may use it very satisfactorily.

Besides the digest of decisions the volume contains the original Act to Regulate Commerce, the Elkins act, the Expedition act, the Act in relation to testimony, etc., the rules of practice before the Commission, its conference rulings and tariff circulars and its orders prescribing a Uniform System of Accounts.

Letters to the Editor.

DEMURRAGE ON PRIVATE CARS.

Railroad Commission of Ohio,
Columbus, Ohio, October 20, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

I have read with interest Robert J. Bailey's article on private cars in your issue of October 9 and your editorial on the same subject in your issue of October 16. If you will pardon the presumption, I am very much inclined to believe that both Mr. Bailey and yourself have lost sight of the vital point of the question. The controlling fact upon which the Interstate Commerce Commission based its ruling that private

cars on private tracks should not be subject to demurrage seems to have been that, while not in motion, private cars cost the railroad company no rental. Railroads pay each other per diem for the use of cars; but pay mileage for the use of private cars.

I never could see any reason why the rental of one car should be on a different basis than the rental of another. If the railroads will discontinue the mileage basis of payment for the use of private cars, and put them on a per diem basis, the same as cars of other railroads, I feel very sure that the Interstate Commerce Commission would rule that demurrage should be charged while such cars were on private tracks, other than tracks belonging to the owners of the cars.

There is no denying the fact that it does not seem unfair that a railroad company should demand rental (and a rental embracing a penalty feature) for a car on the private track of a consignee, when at the same time the railroad is paying no rental for the same car, to the owner of it.

O. P. GOTHLIN,
Commissioner.

SCIENTIFIC VALUATION IN WISCONSIN.

St. Paul, Minn., October 14, 1908.

To the Editor of the Railroad Age Gazette:

The editorial in your issue of October 9, "Railroad Revaluation with an Example," makes a very broad assertion when it states "Again this, if we are not mistaken, represents the first really systematic revaluation of any of the great railroad systems of the country. It is obviously to be sharply distinguished from the crude, hasty and unscientific valuations based on foggy generalities attempted by some of the states in order to 'squeeze out' alleged watered stock."

In justice to an otherwise instructive editorial as well as in fairness to those whose labors in the field of railroad valuation cannot be classed in the category of the quotation; there should be at least some modification of the statement. I think you will observe from the phraseology used there is no discrimination, expressed or implied, but a general reflection upon all valuations except the one under consideration. Inasmuch as your editorial is based upon an inference drawn from the report of the New Haven Company to its stockholders, it does not seem justifiable to condemn all else that has been done in the field of replacement value.

As early as 1887 I was associated with my father in estimating the cost of reproducing the Pacific railroads for the United States Senate Commission, and I wish to assure you that the work as conducted was not unscientific nor was it crudely or hastily performed. Subsequently, I have estimated the replacement value of other railroads, and in that capacity was indirectly associated with the Wisconsin railroad valuation. The engineer in charge of that work for the state can speak for himself if he so desires, but my observation of it, which was a critical one, does not enable me to place it within the limitations of your editorial, and the same is true of the Michigan railroad valuation.

My observation and experience has been that biased judgment is not wholly confined to the public and its servants but that there is a possibility and in some instances a probability of such a condition existing in the estimates of replacement value as prepared by the railroad companies, and it is also true that the problem presents matters upon which there may be an entirely honest and conscientious difference of opinion.

It is impossible for me at this time to enter upon a discussion of the subject, but in support of able engineers of many western railroads who have made careful valuations of the properties they represent, in support of the care with which the physical valuations in Michigan and Wisconsin were made, and in defense of the work which I am completing for the state of Minnesota, I think your editorial is misleading in its understanding and interpretation of the accomplishments in the field of replacement value of railroad property.

In order that you may yourself determine to what extent the influences mentioned in your editorial have actuated the Minnesota appraisal, I invite you or your representative to St. Paul to review in detail the methods upon which the replacement values have been established under my charge, and when the findings of the Minnesota valuation shall have been made public there will be opportunity to draw some interesting conclusions upon questions which can be determined by no process other than physical valuation.

Very truly yours,

DWIGHT C. MORGAN,
Engineer-in-Chief, Minnesota R. R. and Warehouse Commission.

WEIGHT OF LOCOMOTIVES, 1881-1900.

New York, Oct. 16, 1908.

To the Editor of the Railroad Age Gazette:

I have noticed, in your issue of October 16, 1908, a letter from R. V. Taylor contesting figures given by Professor Ripley, in regard to the weight of locomotives used in the United States between 1881 and 1900.

I have not at hand figures for the period indicated, but subsequent statistics published by the Interstate Commerce Commission would seem to prove that Professor Ripley's figures are not general averages for all locomotives, but only maximum averages for the heaviest classes of engines.

The averages and maximum averages (in tons) given by the Interstate Commerce Commission for the weight of locomotives *exclusive of tenders*, are as follows:

	1904.	1905.	1906.
Single expansion:			
General average	60	62	66
Maximum average	102	167	167
	(1)	(2)	(2)
4-Cyl. compound:			
General average	93	95	98
Maximum average	149	149	147
	(3)	(4)	(4)
2-Cyl. compound:			
General average	83	83	84
Maximum average	95	95	95
	(5)	(5)	(5)

(1)—Class E4 .... oOOOOo >
(2)—Class A6 .... OOOOOO >
(3)—Class D5 .... oOOOOO >
(4)—Class E5 ... oOOOOOo >
(5)—Class E3 ... oOOOo >

R. INGOUF,
Ingénieur E. C. P.

WEIGHTS OF LOCOMOTIVES, 1881-1900.

East Cleveland, Ohio, October 19, 1908.

To the Editor of the Railroad Age Gazette:

Referring to the letter of Mr. R. V. Taylor on page 1,137 of your issue of October 16, relative to the average weights of locomotives as given by Professor William Z. Ripley:

Mr. Taylor would seem to be quite justified in questioning the accuracy of these weights, as, I believe, the average weight of locomotives to-day does not exceed 250,000 lbs.

In October, 1898, the Pittsburgh Locomotive Works built a locomotive, for the Union Railroad, the total weight of which, excluding the tender, was 230,000 lbs., and in June, 1900, two locomotives were completed by the same works for what is now the Bessemer & Lake Erie Railroad, weighing 250,300 lbs.

Professor Ripley has evidently used the maximum, instead of the average, weights subsequent to 1895.

C. D. WRIGHT.

In France the Orleans Railroad has reinforced, as it were, the penalty for detention of cars by consignees, by paying for anticipating the time allowed for unloading. The regulations allow 24 hours for unloading, provided that notice of arrival is given to the consignee before 6 p. m. of the previous day, Sundays and holidays not counted. From Aug. 15 through the season of heavy traffic the Orleans Railroad pays 2 francs for every 24 hours saved from this allowance for ordinary cars and 3 francs for cars carrying 20 tons or more.

Contributed Papers.

SUCCESSFUL EXPERIMENT IN PRE-COOLED FRUIT SHIPPING BY NORTHERN PACIFIC.

The experiment of the Northern Pacific in shipping pre-cooled fruit from Washington to New York in a special refrigerator car having double flax fiber insulation and Bohn ice tanks was highly satisfactory. The car was loaded at North Yakima, Wash., on September 23 with 504 boxes of pears. It was iced the day before, and after loading was sent to the pre-cooling plant, the temperature being reduced to 38 deg. The car left North Yakima September 24 and arrived at St. Paul at 3 o'clock a.m. October 1. The temperature taken at St. Paul showed 34 deg. at the bottom of the car and 38 deg. on top of the load. There was, therefore, no change in the temperature of the car between North Yakima and St. Paul. The car passed Chicago October 3 and arrived at New York October 6. The temperature in the car at New York was 35 deg. on the floor and 38 deg. on top of the load.

The ice tanks contained 5 tons on leaving North Yakima, 4 tons passing St. Paul and 3½ tons upon arrival in New York. The car was not re-iced between North Yakima and New York. The pears were sold at auction in New York October 8 at an average price of $2.46 per box.

R. P. Ober, General Agent Refrigerator Car Line of the Northern Pacific, states that while the cost of equipping such cars is considerably higher than for an ordinary refrigerator car, the results obtained from this test appear to justify the use of such cars by both railroads and shippers. Mr. Ober expects to make a test of the car in cold weather to see if the insulation will prevent the lading from freezing.

WORK OF THE C., M. & ST. P. IN TACOMA AND SEATTLE.

The Pacific extension of the Chicago, Milwaukee & St. Paul is now extended within the city limits of both Tacoma and Seattle. Progress at Tacoma is such that A. M. Ingersoll, the new vice-president, has opened an office in the Bernice Building, of that city. The road will have two terminals in Tacoma —one at 25th and Pacific avenues, and the other on the tide flats at the mouth of the Puyallup river, for connections with coastwise and ocean vessels. The main line is built to the Puyallup river and rails are laid across the river on a wooden bridge and falsework. Work on the steel bridge for this crossing is about to begin. The road reaches its new station site in Tacoma, which is on a considerably higher level than the tide flat terminals, by means of a pile trestle on both sides of the Puyallup river. On the main line beyond the trestle the grade has settled or washed down considerably, and in some places the rails are about 2 ft. below the bridge level, necessitating refilling. On the tide flats progress is slow, but consistent. The tidewater branch has rails laid to the mouth of the Puyallup river. A large amount of bulkheading and piling is being put in, on which to build the wharves. Between the Puyallup river and the Union Depot site good progress is being made. About four blocks are being graded and a long, 30-ft. cut made through a hill. On the two blocks next the depot site nothing has been done. The Tacoma Eastern and the C., M. & St. P. are to have a union station at Pacific and 25th avenues, in a thickly settled part of Tacoma, which is now a considerable distance from any station. Excavation on the hill where the station is to be built is just started.

In Seattle nothing has been done on either the tide flats or the passenger station. The present end of the road is at Georgetown, a suburb of Seattle, four miles out, to which the grading has been recently finished.

The company recently filed articles of incorporation for the C., M. & St. P. Hospital Association, to establish a hospital at Seattle for the employees of the road. The association is to be similar to that of the Northern Pacific, which has hospitals at Tacoma, Missoula and Brainerd. The officers are: Albert I. Bouffleur, Chicago, the chief surgeon of the road; H. H. Field, Seattle, general Western counsel, and D. H. Eugene Allen, surgeon for the Pacific division, which will cover all the territory in Washington west of the Columbia river. The association has divided the road into four divisions to facilitate the work. Temporarily, employees will be cared for at the Pacific Hospital at Seattle. Similar arrangements are being made at Tacoma. The association will have surgeons in all of the principal towns along the line. A board of managers is soon to be appointed, representing both the company and the employees.

The C., M. & St. P. has announced its intention to establish an Atlantic-Pacific service, arrangements having been made with the Pennsylvania to carry one car of the train from the coast through to New York.

BRIDGES AND BUILDINGS CONVENTION.

The annual convention of the Association of Railway Superintendents of Bridges and Buildings was held in Washington, October 20-22, with more than 80 members present. On the first day the committee reports on reinforced concrete culverts and short span bridges and on fire protection were read. The latter was a progress report, the full report being promised for publication in the proceedings within a few weeks.

The report on the revision of the constitution was submitted on the following day and adopted. The name of the association is changed to American Railway Bridge and Building Association. Membership is divided into two classes, active and life members. Those eligible for active membership shall be those in responsible positions in charge of work connected with building or maintaining railroad bridges and other structures, as well as professors of engineering, government timber experts, and railroad architects. The executive committee is to hereafter include the vice-presidents, as well as the president, secretary, treasurer and six executive members. After the adoption of the constitution, O. J. Travis, first president of the association, and H. W. Phillips and L. H. Porter, of the New York, New Haven & Hartford, were made life members.

The next committee report was on the use of gasolene and kerosene engines for water supply, draw bridges, etc. The committee referred to a similar report submitted at the 1899 convention, reprinting from this report a table showing the comparative costs of pumping water with gasolene and other engines. Usually there is almost no saving in using gasolene engines instead of steam, gasolene engine pumping plants being preferable because of the simplicity and ease of operation. Kerosene is cheaper and has greater heat value, but such an engine requires more care and is not yet perfected. For draw bridges, it is evident that it is preferable to use an engine which is always ready for immediate operation, and which consumes no fuel during the periods the draw is closed. The report included several tables, contributed by members, showing comparative costs of pumping with different engines, and also letters concerning the use of kerosene.

The report on modern dwelling houses for section foremen and men in outlying districts was a progress report, the committee only taking up the subject of portable dwellings, that is, cars. It had gathered most of the material for a full report, and in the meantime submitted drawings and descriptions of a converted box car with sleeping, cooking and dining accommodations for four men; a sleeping car for 24 men; a dining and cooking car for a good-sized gang; a bunk car for 14 laborers, and a portable bunk house for four or eight men.

The report on the construction of cofferdams was a full report illustrated with a number of photographs and drawings. General recommendations as to the character of structures for certain requirements were given, including size of timbers

and method of driving staves and sheathing. It then quoted in full a number of letters from members giving individual experiences.

The report on the preservation of timber took up principally the creosoting process, zinc chloride being better suited for tie treating in localities not subject to much rainfall, as the solution is likely to leach out if exposed to the action of water. Creosoting is better adapted to structural timber. After describing the different processes of impregnation, approximate costs of treatment were given. An appendix to the report quoted a United States Forestry report on timber output, and then gave the specifications for creosoting timber on the Atchison and the Louisville & Nashville, and a description of the methods of creosoting and analysis of the oil by the Pacific Creosoting Co., Eagle Harbor, Wash.

The report on smoke jacks was a continuation of last year's report and dealt particularly with wooden and composition jacks, or a combination of the two. Different designs were described and shown by drawings. Most of the combination jacks were of wood, lined with various fireproofing materials.

The report on protection of embankments from the effect of high water was brief, giving the experiences of but three members. It described methods of using riprap, deflecting dykes, fascines, and willow mattresses in connection with riprap. One road had sodded the bank at a point exposed to occasional wave wash, but this had not yet been tested sufficiently to judge of its value.

The committee on equipment and tools for erecting steel bridges submitted a list of tools required.

The report on waterproofing of concrete-covered steel floors of bridges quoted letters of members showing that in all waterproofing some asphalt or tar is used, usually in the form of saturated fabrics. It quoted a number of letters showing standard designs, illustrated with a number of drawings.

The report on pile and frame trestle bridges consisted of drawings of standard structures on several roads, with answers to a circular letter asking for information as to rail fastenings, anti-creepers, guard rails, span lengths, sizes of timbers for different members, life of these members, and the use of concrete piles.

The report on methods of erecting truss bridges gave brief recommendations as to methods to be employed, depending on whether the structures are erected under traffic or without traffic. It then quoted letters from three members, showing, with drawings and photographs, their methods of erecting certain bridges.

Several of the above papers will be later published in the *Railroad Age Gazette*.

Before adjourning, the association selected Jacksonville, Fla., as the next place of meeting. The following officers were elected for the coming year: President, J. P. Canty, B. & M.; First Vice-President, H. Rettinghouse, C. & N. W.; Second Vice-President, F. E. Schall, Lehigh Valley; Third Vice-President, J. S. Lemond, Southern Ry.; Fourth Vice-President, A. E. Killam, Intercolonial; Secretary, S. F. Patterson, B. & M.; Treasurer, C. P. Austin, B. & M.; Executive Committee, J. N. Penwell, L. E. & W.; Willard Beahan, L. S. & M. S.; F. B. Scheetz, Mo. Pac.; W. H. Finley, C. & N. W.; L. D. Hadwen, C., M. & St. P.; T. J. Fullem, Ill. Cent.

The committee on subjects for next year gave the following list:

1. Various Methods of Carrying Electric Transmission Wires Over Railroad Tracks, and the Best Way to Protect Tracks and Company Wires.
2. Inspection of Bridges and Buildings; Blanks to be Used; Methods of Inspection; Frequency, etc.
3. Organization of a Bridge and Building Department.
4. Water Stations and Water Supply.
5. Turntables; Design, Length and Power for Operating Them.
6. Design of Material Yards, Platforms and Sheds.
7. Design of Portable Derricks and Push Cars for the Same.
8. Best Method of Housing Railroad Bridge and Construction Gangs.
9. Pile and Frame Trestle Bridges.
10. Docks and Wharves, including Appliances for Transferring Cars from Wharves to Floating Equipment; Best Method of Wheeling Freight from Deck Houses to Boats at Various Stages of Water.
11. Railroad Engine House Construction.
12. Painting: Best Paint to Use; Effect of Salt Water; Use of Compressed Air in Cleaning and Painting Iron.
13. Coaling Stations and Cinder Pits.

PACIFIC LOCOMOTIVE FOR THE CHICAGO & ALTON.

Attention has been called to an error in the ratios given for the dimensions of the Pacific locomotive of the Chicago & Alton Railroad, published on page 1044 of the issue of October 2. The displacement of the two cylinders should be 13.46, instead of 12.32 cu. ft., which makes:

$$\frac{\text{Heating surface}}{\text{Displacement, 2 cylinders}} = 291.75$$

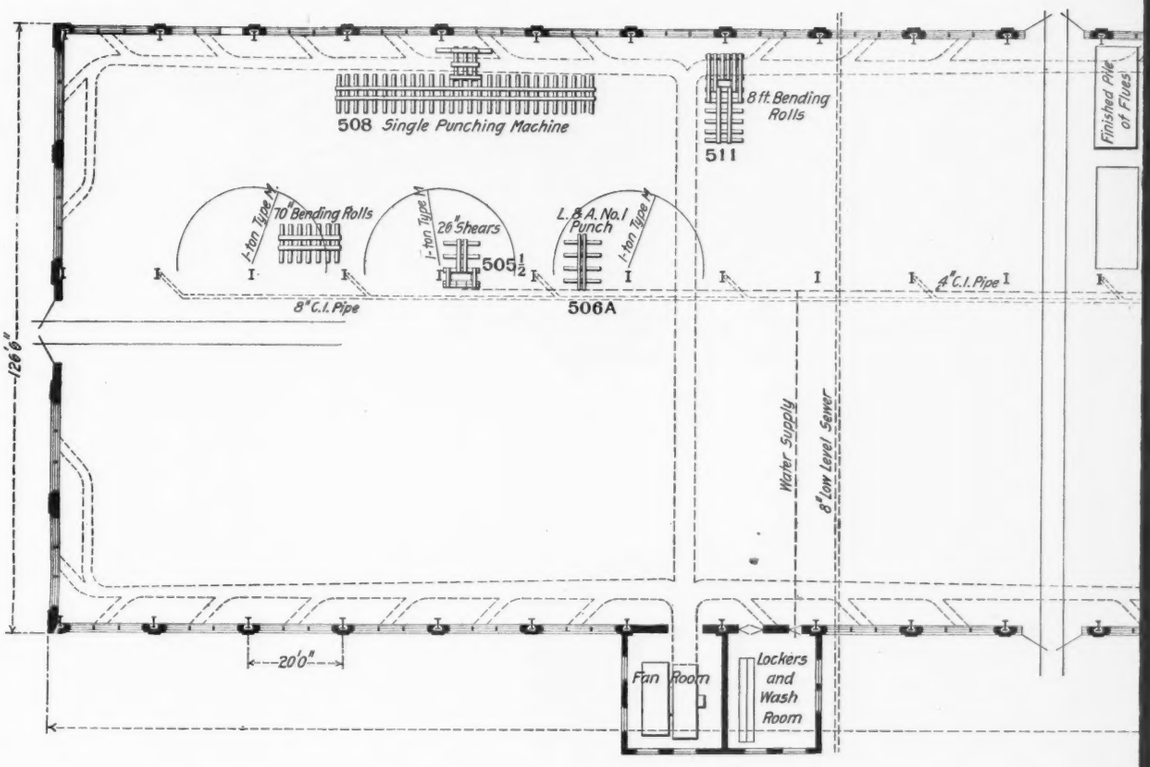
$$\frac{\text{Grate area}}{\text{Displacement, 2 cylinders}} = 2.45$$

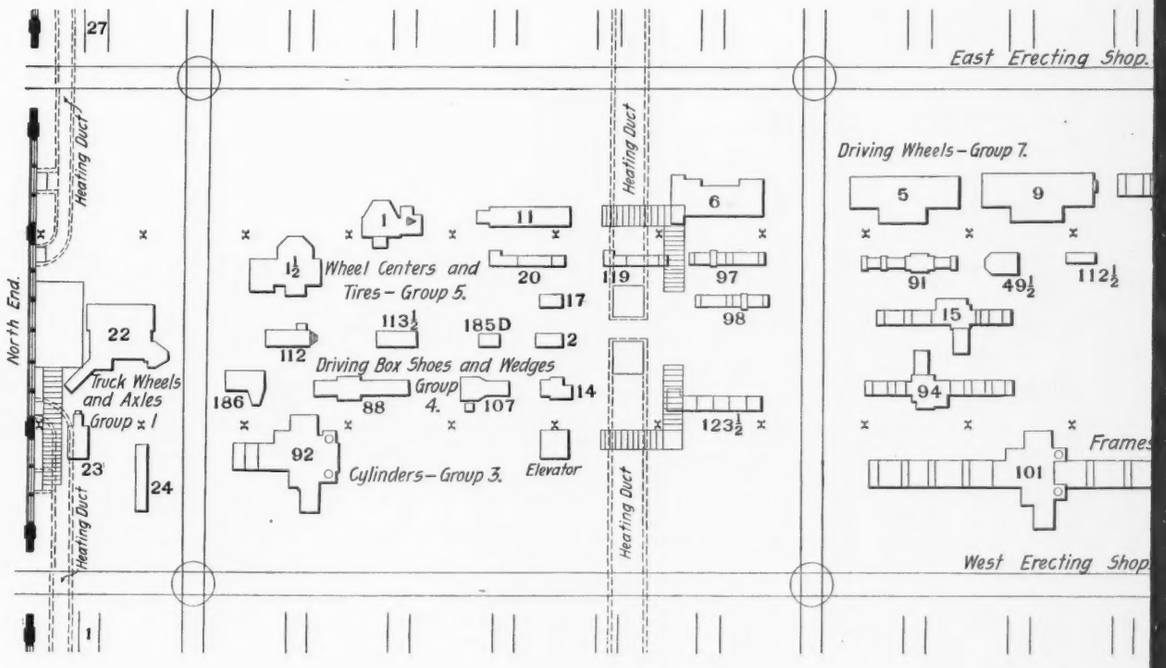
NORTHERN PACIFIC DOUBLE TRACK BETWEEN SEATTLE AND TACOMA.

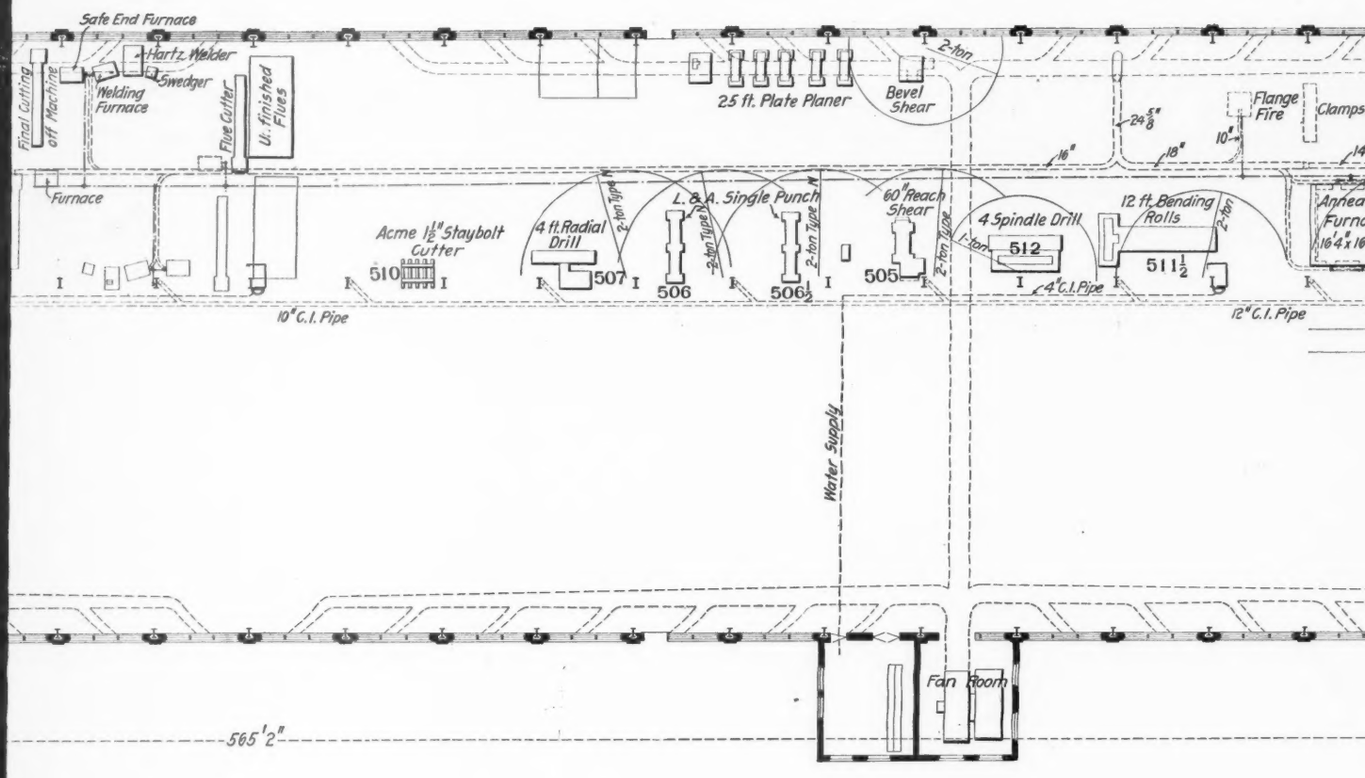
With the completion of a nine-mile section between Meeker and Auburn, the Northern Pacific will have shortly a continuous double track line between Seattle and South Tacoma, Wash. This double track has been a gradual development, starting in 1890 with 5½ miles laid between South Tacoma and Tacoma. The following year the nine-mile stretch from Tacoma to Meeker was laid. As business developed along Lake Washington, on the east side of Seattle, the line was double-tracked from Black River to Argo, 6½ miles, in 1902. Then from Argo to Seattle, 3½ miles, a succession of side tracks was gradually combined into a continuous second track. Other side tracks were similarly connected up into second track, leaving the only single-track section that between Meeker and Auburn, first mentioned. This is now about 75 per cent. done. A part of the double-track line is laid with 85-lb. rail and the remainder with a lighter weight.

The revising and straightening of the line between Vancouver and Kalama, Wash., the latter on the Columbia River, was mentioned in the account of the Spokane, Portland & Seattle Ry. in the *Railroad Gazette*, September 27, 1907. The Northern Pacific will use the bridge of the S., P. & S. over the Columbia, abandoning the old, slow, inconvenient ferry, which is a historic feature of this crossing. With the completion of this work the time of passenger trains between Seattle and Portland will be reduced nearly an hour.

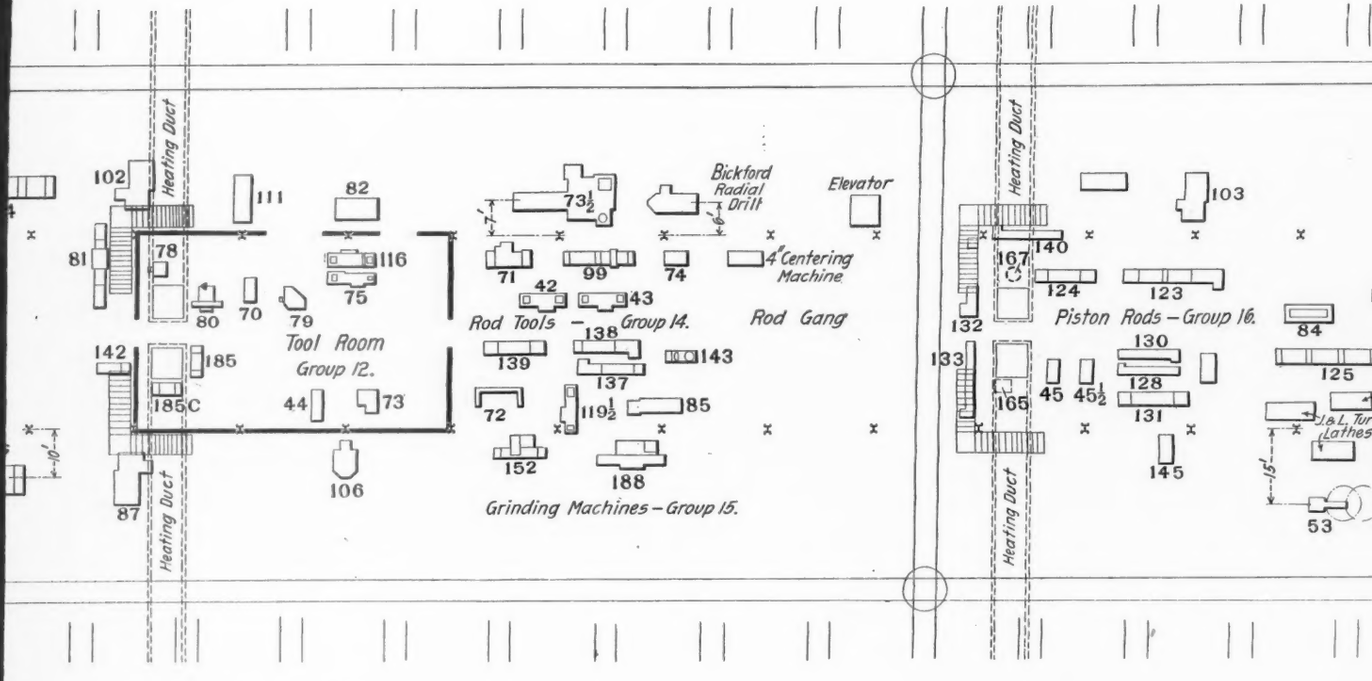
The management of the Egyptian railroads is said to have sent a circular to all railroad officers, complaining of the sleepiness of its employees. Many accidents had occurred recently because the men on duty went to sleep. They were admonished that they must keep awake or they would be discharged without pensions. This would seem to be a reasonable requirement; but the Egyptian Brotherhood of Station-masters, or what is equivalent thereto, with practical unanimity is said to threaten to strike if the circular is not withdrawn. And yet these railroads are more than a thousand miles from the land of the tzetze fly, the sleeping sickness, and the scene of the future exploits of the Great American Hunter. This Egyptian brotherhood seems to have traits very similar to those which have been observed in certain American railroad brotherhoods.


508 Single Punching Machine
8 ft. Bending Rolls
511
Finished Pile of Flues
70" Bending Rolls
1-ton Type M
26" Shears
505½
L. S. A. No. 1 Punch
506A
8" C.I. Pipe
4" C.I. Pipe
126'6"
Water Supply
8" Low Level Sewer
20'0"
Fan Room
Lockers and Wash Room


East Erecting Shop
West Erecting Shop
North End
Heating Duct
Wheel Centers and Tires – Group 5.
Driving Box Shoes and Wedges Group 4.
Cylinders – Group 3.
Elevator
Driving Wheels – Group 7.
Truck Wheels and Axles Group 1
Frames

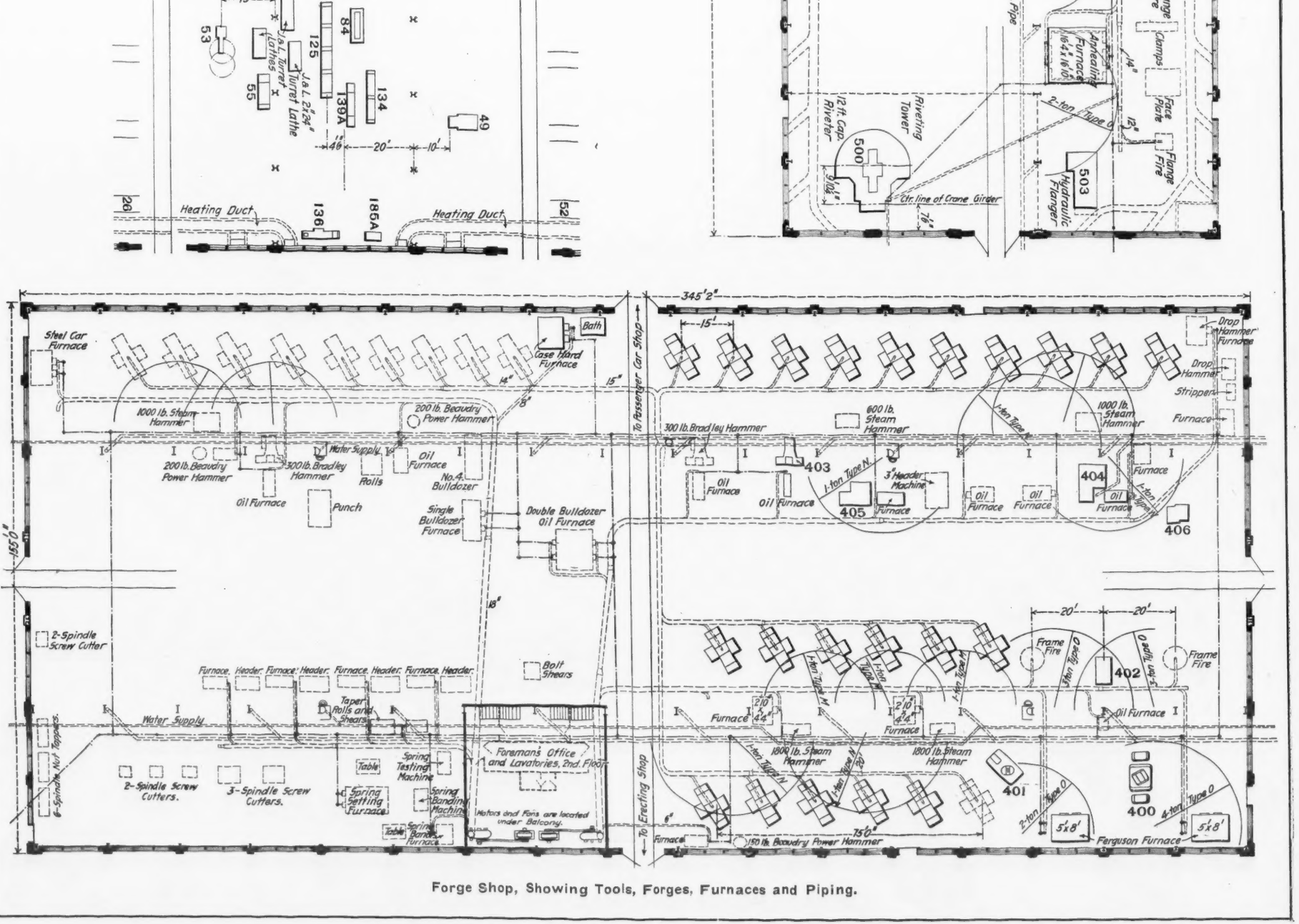


Boiler Shop.



Machine and Erecting Shop.

EECH GROVE SHOPS OF THE BIG FOUR.



Forge Shop, Showing Tools, Forges, Furnaces and Piping.

THE BEECH GROVE SHOPS OF THE BIG FOUR.

BY WILLIAM FORSYTH,
Associate Editor, *Railroad Age Gazette.*

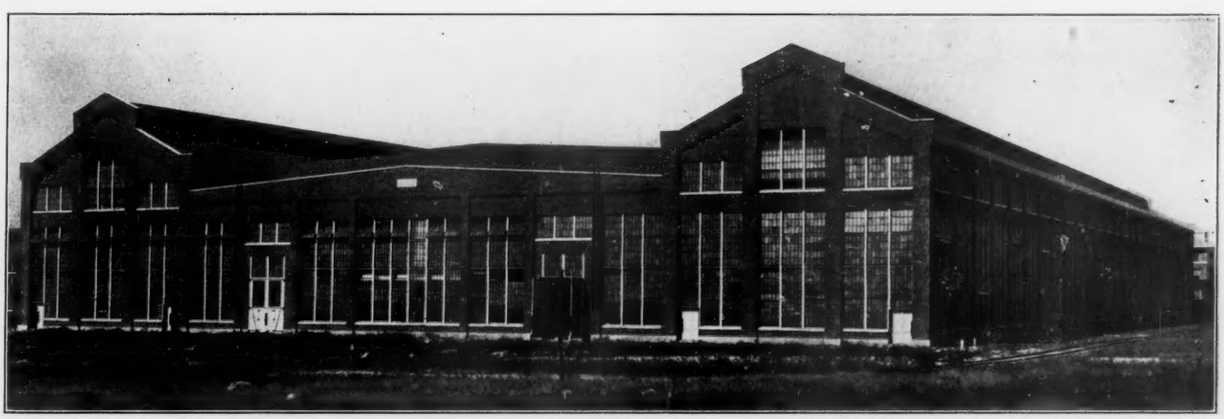
The large locomotive repair shops which the Cleveland, Cincinnati, Chicago & St. Louis (Big Four) has been building near Indianapolis during the past two years at a cost of about two million dollars, were finished and occupied in June of this year. The complete plan, showing the location of the future car shops with respect to the locomotive shops, a cross-section of the machine and erecting shop and a plan of the power house equipment, together with some interior and exterior views of the buildings then nearly finished, were published in the *Railroad Gazette*, November 29, 1907. The present article gives illustrations of the completed buildings and a list of the machine tools and their location, together with some account of the methods of driving.

General View of Beech Grove Shops.

The machine and erecting shop is 309 ft. wide, 578 ft. long, and belongs to what has been aptly named the double banked transverse type. Two erecting shops, 69 ft. wide and 50 ft. 3 in. high, are served by one 120-ton electric traveling crane, and one 10-ton messenger crane below. There are two interior bays, each 65 ft. wide, for machine tools and material, and one central bay 40 ft. wide, with a balcony; the latter is occupied by the tin and copper smith shops, air-brake repairs and brass finishers, and the large hot blast fans, lavatories and lockers.

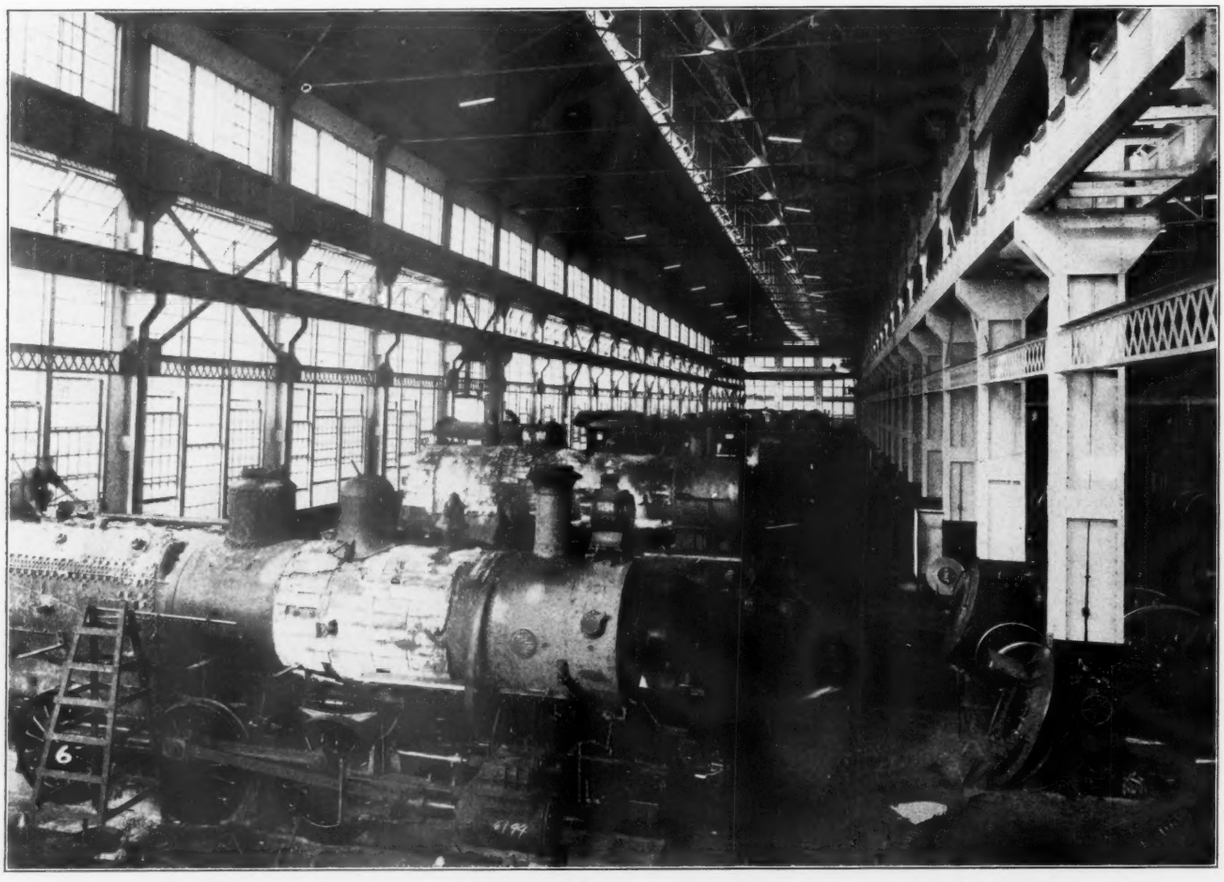
There are 52 erecting pits divided equally between the two outside bays. Four pits, on through tracks, are for wheeling and unwheeling locomotives, leaving 48 for locomotive repairs. On the basis of 48 pits, there is about 1,100 sq. ft. of floor space for machine tools for each erecting pit. The machine floor occupies the central section, extending 15 ft. outside the columns of the middle bay, and this portion, which is served by the 10-ton traveling cranes, is occupied by the larger machine tools. These cranes are also available for handling material to platforms extending beyond the balcony. The columns of the central bay and the girders connecting them transversely are made use of to support electric motors, line shafts and counter shafts. Every alternate column of this bay is also fitted with bracket cranes with air cylinder hoists for handling material to the machine tools. These cranes were supplied by the Whiting Foundry Equipment Co., Harvey, Ill., which also furnished the jib and bracket cranes for the smith shop and boiler shop. The tools directly under the balcony are served by a small traveling crane fitted with a Harrington block. The large locomotive traveling cranes in the locomotive shop, smith shop and boiler shop were all made by the Niles-Bement-Pond Company.

The generators in the power house supply both alternating and direct-current for the machine tool motors. Three Westinghouse-Parsons steam turbine units, direct-connected to 500-k.w., three-phase, 480-volt generators, supply current to the motors driving the tools running at constant speed. A 200-k.w. Westinghouse motor-generator set supplies 250-volt direct-current to the variable speed tools. The majority of the induction motors were supplied by the General Electric Company, while the direct-current motors were furnished by the Westinghouse company. In some instances motors of special design by other makers were supplied with directly driven tools. The tool equipment in the machine shop is not complete, but the majority of those now in place are new and of the most improved design. Referring to the plan, shown on the accompanying inset, showing the location of tools, it will be observed that they are arranged in the following grand divisions, commencing at the north end of the shop, and the term "group" here used does not refer to the method of driving, but simply to the assemblage of tools for a specific purpose. Group 1 consists of tools for truck wheels and axles; group 2, driving axles; group 3, cylinders; group 4, driving box, shoes and wedges; group 5, wheel centers and tires; group 6, crank pins, eccentrics and straps; group 7, driving

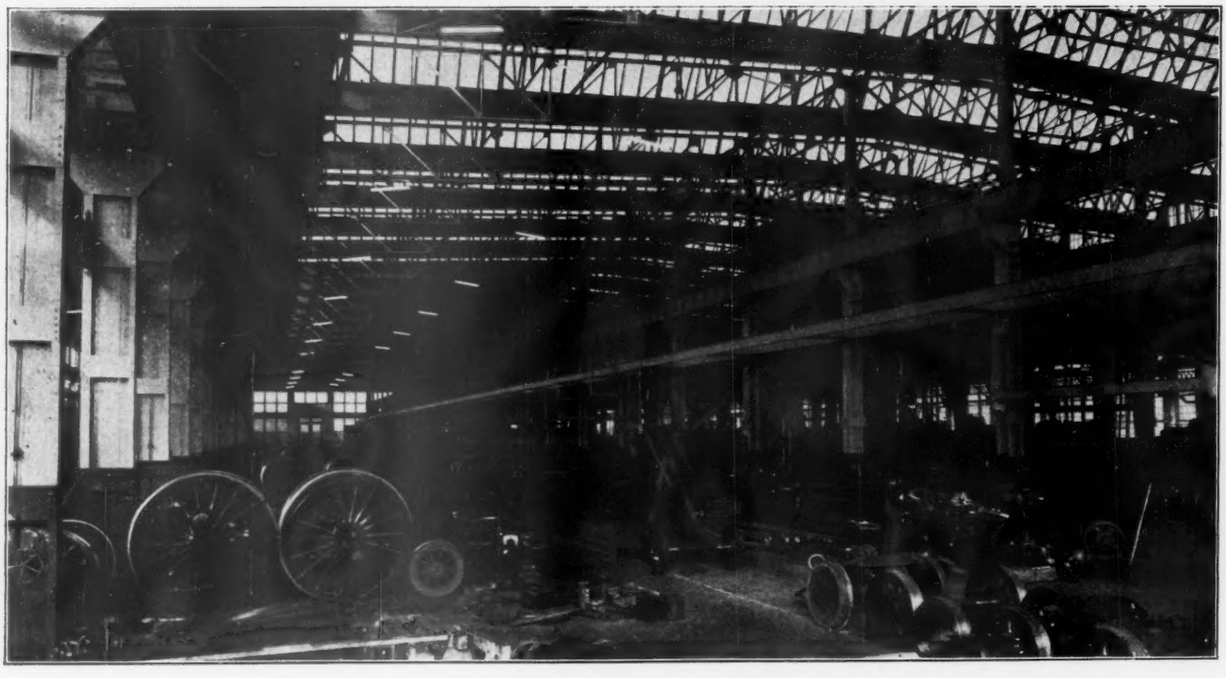


End View of Locomotive, Machine and Erecting Shop.

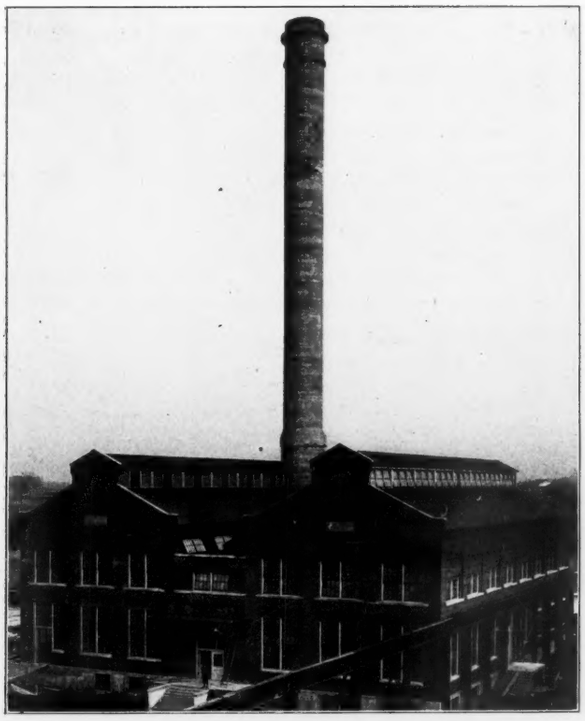
wheel, tire turning and quartering; group 8, locomotive frames; groups 9, 10, 11 and 13, general service tools, lathes, shapers and drills; group 12, tool room; group 14, main and connecting rods; group 15, grinding machines; group 16, piston rods and cross-heads. The tools on this plan are all numbered and similar numbers will be found in regular order with the name of the tool and the name of the maker in the subjoined tool list. The tool room is located near the center of the building and under the balcony. It is equipped with two 16-in. engine lathes, one 24-in. shaper and No. 4 Universal



Interior of One Erecting Shop.



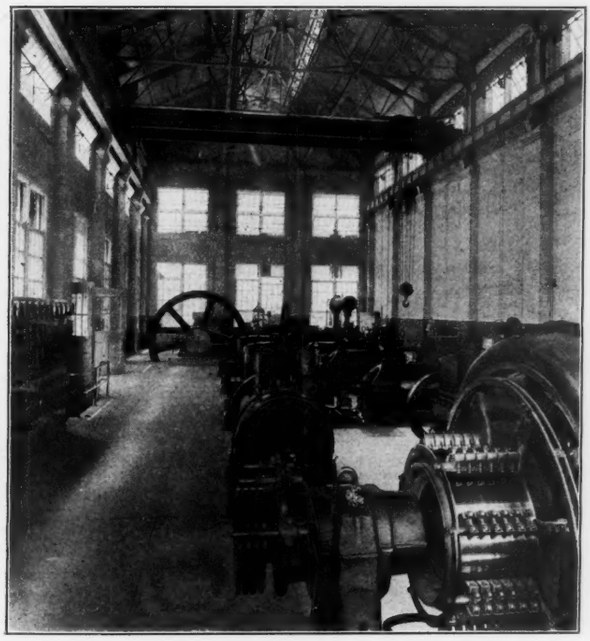
Machine and Wheel Bay; Beech Grove Shops of the Big Four.



Power House; Beech Grove Shops.

miller, one Sellers tool grinder, one twist drill grinder, two 24-in. x 3-in. safety emery grinders, one No. 2 reamer and cutter grinder and one 20-in. drill. Directly south of the tool room are the machine tools for finishing main rods and side rods, and adjacent to it under the balcony is a space for hand finishing rods. The rods of large locomotives are so heavy that it was thought advisable to provide convenient means for lifting them in the rod gang and to the various tools. This department is therefore served by a light traveling crane with a Harrington block.

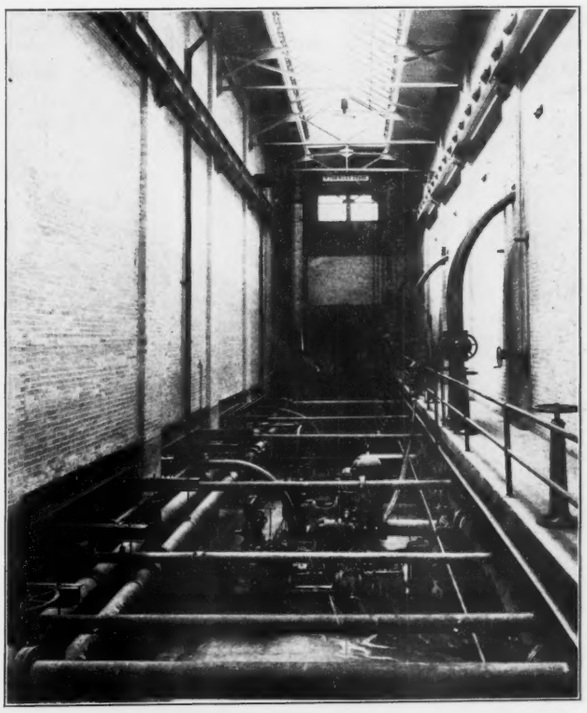
This large machine and erecting shop is equipped with 128 automatic Type "P" Cooper-Hewitt lamps, and the illumination is unusually good and satisfactory on account of the fact that it is almost entirely devoid of shadows. It is, we believe, the first use of Cooper-Hewitt lamps in a large locomotive shop and the installation is therefore particularly interesting.



Engine Room.

The forge and smith shop is parallel with the machine and erecting shop, 75 ft. east. This spacing between shops is preserved throughout the plant, 75 ft. being the distance between the outer walls of all adjacent buildings. The forge and smith shop is 345 ft. x 155 ft. and a good idea of its construction and arrangement may be had from the interior view of the shop. The three large steam hammers were made by the Chambersburg Engineering Co., Chambersburg, Pa., the largest having a capacity of 6,000 lbs. The others are 3,000 lbs. and 2,000 lbs. respectively, the latter a long-stroke hammer for frame welding. There is also a 300-lb. Bradley helve hammer.

The forges and furnaces shown on the side next the proposed coach shop are not yet installed, and this is also true of those shown in dotted lines on the side next to the locomotive shop, only 11 double forges being now in place. The furnaces near the large hammers are the Ferguson design, supplied by Joseph T. Ryerson & Son, Chicago. There is one large 4-in. forging machine made by the Ajax Manufacturing Co., Cleveland, O.; one 2-in. forging machine made by the Acme Machinery Co., Cleveland, Ohio, and one 2-in. bar shear made by the Hilles & Jones Co., Wilmington, Del. The fans for air blast to forge and furnace are under the balcony, which is used for the lavatory and the foreman's office. The fans are No. 10 extra heavy Sturtevant gas blowers, running at 1,390 r.p.m.; each being belt-driven from a 75-h.p. G. E. motor running at 675 r.p.m. Beyond the office will be installed machinery for the manufacture and repair of plate springs, and this is shown in dotted lines on the plan. Ample space is also allotted for bolt headers, bolt threaders and nut tappers.



Pump Room in Power House.

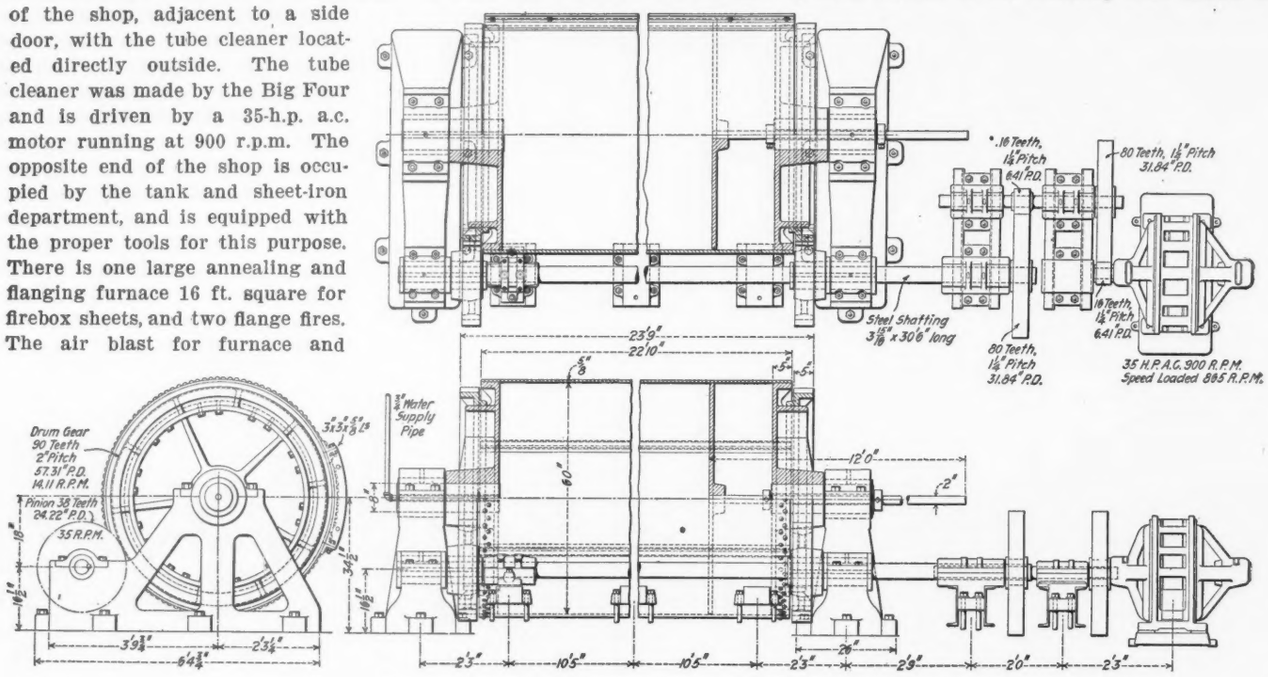
THE BOILER SHOP.

The boiler shop is at right angles to the machine and erecting shop, parallel with its north end and also parallel with the runways of the 10-ton yard crane, which connect it on the opposite side with the storehouse platform. This shop is 565 ft. long and 126 ft. 6 in. wide. It has two wings on

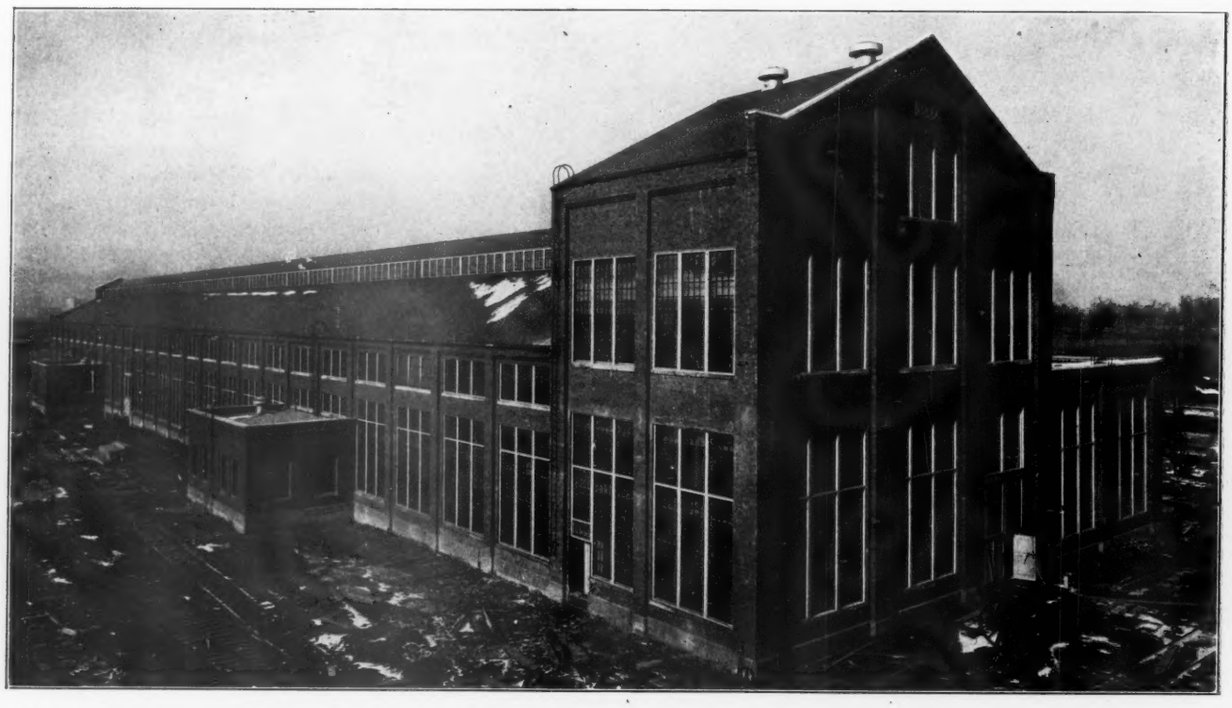
the south side, each 24 ft. x 42 ft., for fan houses, lockers and wash rooms, and at one end of the building there is a large riveting tower for the 17-ft. gap hydraulic riveter, which was supplied by the Chambersburg Engineering Co. The four-plunger hydraulic sectional flanger was supplied by the same company. The 12-ft. bending rolls driven by direct-connected motor, and the 8-ft. bending rolls, were made by the Niles-Bement-Pond Co. There are two single shears, one 60-in. throat and one 26-in. throat; two single punches, one 60-in. throat and one 16-in. throat, all supplied by The Long & Allstatter Co., Hamilton, Ohio. Other smaller tools in this shop are shown on the plan and are identified by the numbers in the tool list. The tube department is near the center of the shop, adjacent to a side door, with the tube cleaner located directly outside. The tube cleaner was made by the Big Four and is driven by a 35-h.p. a.c. motor running at 900 r.p.m. The opposite end of the shop is occupied by the tank and sheet-iron department, and is equipped with the proper tools for this purpose. There is one large annealing and flanging furnace 16 ft. square for firebox sheets, and two flange fires. The air blast for furnace and flange fires is supplied by a Sturtevant No. 10 monogram blower belt-driven at 1,130 r.p.m. from an overhead G.E. 35-h.p. motor.

STOREHOUSE.

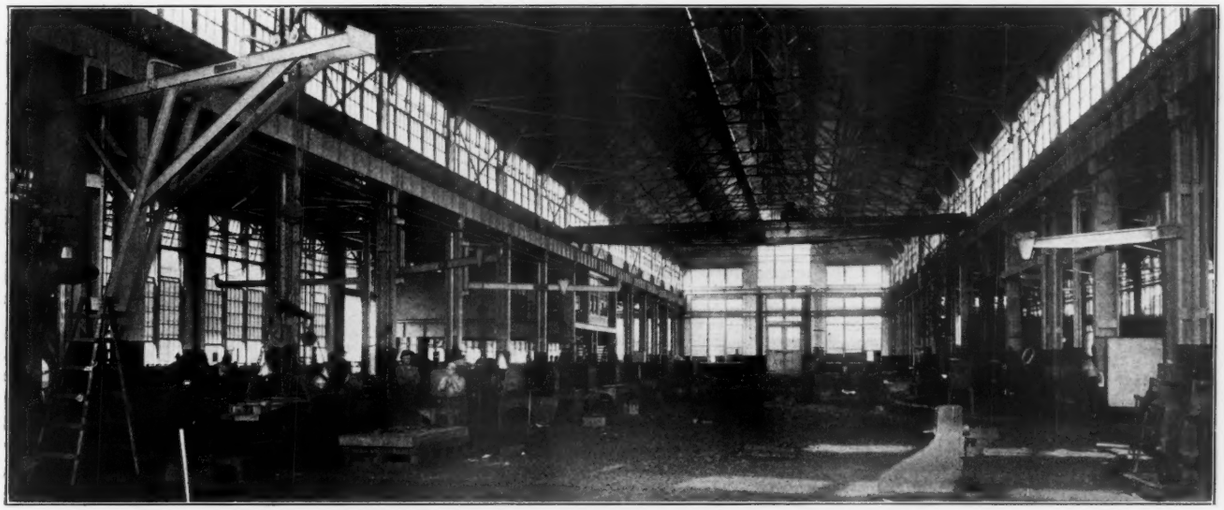
The storehouse and office is a three-story building which has received more attention architecturally than is usually given shop buildings, and presents a handsome appearance. It is 73 ft. x 263 ft. and has a self-supporting reinforced concrete frame with colonial brick exterior walls. The halls and toilet rooms have tessellated tile floors. The general appearance of the concrete interior of the second floor and of the exterior of the building is well illustrated by the large engravings. The arrangement of the offices on the third floor as well as the cross section of the building were shown in



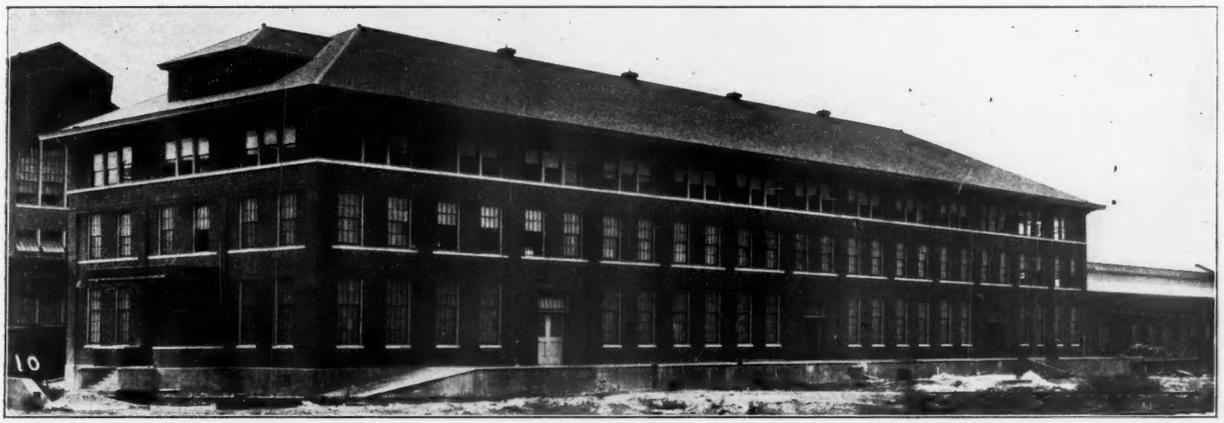
Flue Rattler; Beech Grove Shops of the Big Four.



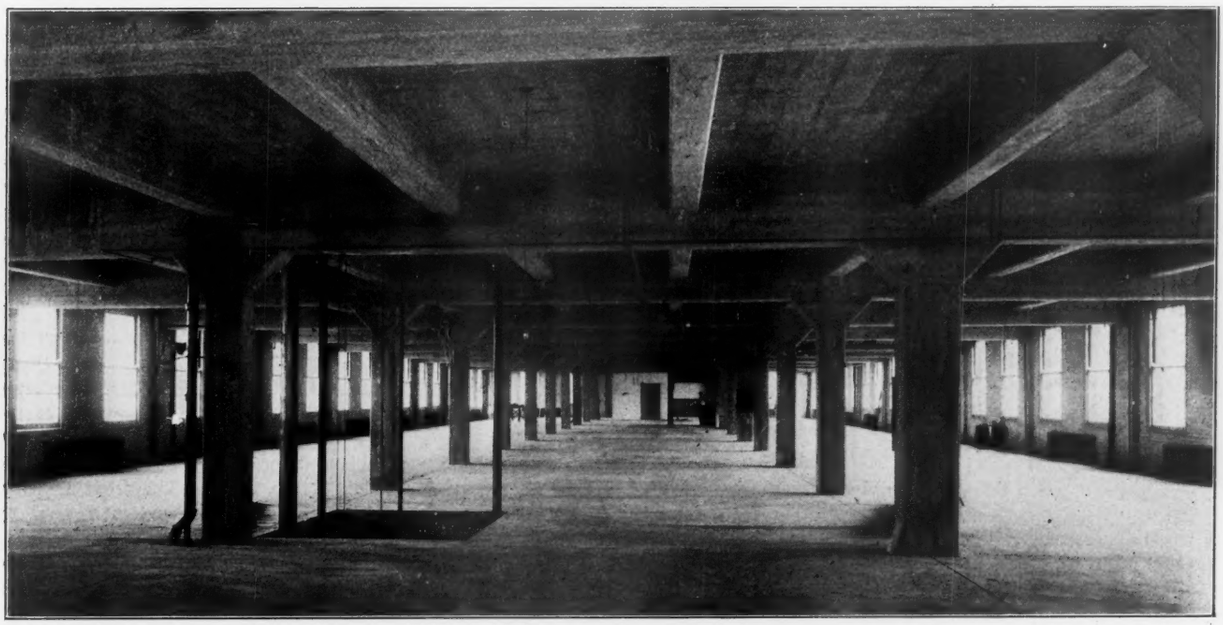
Boiler Shop, Showing Riveting Tower.



Smith Shop.



Storehouse and Office.



Second Floor of Storehouse; Beech Grove Shops of the Big Four.

the article in the *Railroad Gazette*. There are two freight elevators and one passenger elevator, the latter being especially for the offices on the third floor. This building cost $94,000, or about $10 per cubic foot of contents. It is regarded as an economical structure compared with two-story buildings on account of the third story, which did not require any additional expenditure for foundations or roof.

The equipment now tributary to this shop numbers 680 locomotives, and 450 men are employed, nearly all of them on piece work. It is intended to increase this force, as the shops are put in full operation, to 600 or 800 men.

The general scheme for the electrical operation of the shop was worked out by The Arnold Company, Chicago, who were engineers and inspectors for the entire plant. The details for the arrangement of tools and motor drives were prepared in the office of B. D. Lockwood, Mechanical Engineer, under the direction of William Garstang, Superintendent of Motive Power of the Big Four, to whom we are indebted for the drawings.

Machine and Erecting Shop Tools.

Mach. No.	Description.	Maker.
1.	84-in. boring mill	Niles-Bement-Pond Co.
1½.	96-in. boring mill	Betts Machine Co.
2.	32-in. upright drill	Cincinnati Machine Tool Co.
4.	Double R. & L. quartering mach.	Niles-Bement-Pond Co.
5.	90-in. driving wheel lathe	Niles-Bement-Pond Co.
6.	84-in. driving wheel lathe	Niles-Bement-Pond Co.
9.	90-in. driving wheel lathe	Niles-Bement-Pond Co.
11.	600-ton driving wheel press	Niles-Bement-Pond Co.
14.	42-in. boring mill	Niles-Bement-Pond Co.
15.	42-in. x 42-in. x 16-ft. planer, four heads	Niles-Bement-Pond Co.
17.	24-in. back-geared shaper	Gould & Eberhardt.
20.	24-in. x 12-ft. lathe	Lodge & Shipley.
22.	42-in. steel tire car wheel lathe.	Niles-Bement-Pond Co.
23.	48-in. car wheel borer	Niles-Bement-Pond Co.
24.	200-ton car wheel press.	Niles-Bement-Pond Co.
42.	16-in. x 4-ft. lathe.	F. E. Reed Co.
43.	16-in. x 4-ft. lathe.	F. E. Reed Co.
45.	24-in. back-geared shaper	Gould & Eberhardt.
45½.	24-in. back-geared shaper.	Gould & Eberhardt.
49.	50-in. goose-neck drill.	Niles-Bement-Pond Co.
49½.	50-in. goose-neck drill.	Niles-Bement-Pond Co.
53.	Big bore turret lathe, 6¼-in. hole	Gisholt Machine Co.
55.	3-in. x 36-in. turret lathe.	Pratt & Whitney.
70.	24-in. back-geared shaper	Gould & Eberhardt.
71.	26-in. traverse head shaper.	Old—(group drive).
72.	26-in. traverse head shaper	Old—(group drive).
73.	No. 4 universal miller.	Cincinnati Milling Mach. Co.
73½.	48-in. x 48-in. x 14-ft. slab miller.	Newton Mach. Tool Wks.,Inc.
74.	Double head emery grinder, 24-in. x 3-in. wheels.	Bridgeport Safety Emery Wheel Co.
75.	16-in. tool room lathe.	Hendey Machine Co.
78.	Twist drill grinder	William Sellers & Co., Inc.
79.	No. 1 universal tool grinder.	William Sellers & Co., Inc.
80.	No. 2 reamer and cutter grinder.	Bath Grinder Co.
81.	20½-in. x 13-ft. horizontal miller	William Sellers & Co., Inc.
82.	No. 3 vertical miller.	Newton Mach. Tool Wks.,Inc.
84.	60-in. horizontal borer	Niles-Bement-Pond Co.(group driven).
85.	Horizontal borer, 4-in. bar.	Niles-Bement-Pond Co.
87.	6-ft. semi-universal radial drill.	Niles-Bement-Pond Co.
88.	36-in. x 36-in. x 12-ft. planer	Chandler Planer Co.
91.	36-in. x 36-in. x 12-ft. planer.	Niles-Bement-Pond Co.
92.	72-in. x 84-in. under rail x 12-ft. cylinder planer.	Niles-Bement-Pond Co.
94.	48-in. x 48-in. x 18-ft. planer, four heads.	Niles-Bement-Pond Co.
97.	24-in. x 24-in. x 8-ft. planer.	Chandler Planer Co.
98.	24-in. x 24-in. x 8-ft. planer.	Chandler Planer Co.
99.	24-in. x 24-in. x 8-ft. planer.	Chandler Planer Co.
101.	72-in. x 72-in. x 36-ft. frame plnr.	Niles-Bement-Pond Co.
102.	5-ft. radial drill.	Niles-Bement-Pond Co.
103.	5-ft. radial drill	Niles-Bement-Pond Co.
106.	42-in. boring mill.	Gisholt Machine Co.
107.	42-in. boring mill	Colburn Machine Tool Co.
111.	15-in. to 18-in. slotter.	T. C. Dill Machine Co.
112.	20-in. slotter.	Newton Mach. Tool Wks.,Inc.
112½.	12-in. slotter.	Niles-Bement-Pond Co.(group drive).
113½.	20-in. slotter	Niles-Bement-Pond Co.(group drive).
116.	16-in. engine lathe	
119.	18-in. x 10-ft. "	Lodge & Shipley.
119½.	16-in. x 4-ft. "	F. E. Reed Company.
123.	30-in. x 16-ft. "	Lodge & Shipley.
123½.	36-in. x 6-ft. "	Lodge & Shipley.
124.	27-in. x 8-ft. "	Lodge & Shipley(group drive)
125.	24-in. x 22-ft. "	F. E. Reed Co. (group drive).
128.	16-in. x 10-ft. "	Lodge & Shipley(group drive)
130.	16-in. x 10-ft. "	Lodge & Shipley(group drive)
131.	27-in. x 10-ft. "	Lodge & Shipley(group drive)
132.	24-in. x 12-ft. "	Lodge & Shipley.
133.	20-in. x 6-ft. 6-in. lathe.	Lodge & Shipley.
134.	36-in. x 8-ft. lathe	Lodge & Shipley(group drive)
136.	16-in. x 10-ft. "	Lodge & Shipley.
137.	18-in. x 10-ft. "	Lodge & Shipley.
138.	18-in. x 10-ft. "	Lodge & Shipley.
139.	27-in. x 8-ft. "	Lodge & Shipley.
139-A.	27-in. x 8-ft. 2-in. lathe.	Lodge & Shipley(group drive)
140.	20-in. x 6-ft. 6-in. lathe	Lodge & Shipley.
142.	20-in. vertical drill	Davis Machine Tool Co.
143.	20-in. vertical drill.	Davis Machine Tool Co.
145.	32-in. " "	Cincinnati Machine Tool Co.
152.	80-in. guide bar grinder	Bridgeport Safety Emery Wheel Co.
165.	Rack.	
167.	Rack	
185-A.	Double head emery wheel, 24-in. x 3-in. wheels.	Bridgeport Safety Emery Wheel Co.
185.	Double head emery grinder, 24-in. x 3-in.	Bridgeport Safety Emery Wheel Co.
185-C.	Double head emery grinder, 24-in. x 3-in.	Bridgeport Safety Emery Wheel Co.
185-D.	Double head 24-in. x 3-in. emery grinder	Bridgeport Safety Emery Wheel Co.
186.	6-ft. radial drill	Niles-Bement-Pond Co.(group drive).
188.	18-in. x 30-in. x 96-in. gap grinder	Norton Grinding Co.
	4-in. centering machine.	Pratt & Whitney Co.
	2-in. x 24-in. turret lathe.	Jones & Lamson(group drive)
	2-in. x 24-in. turret lathe.	Jones & Lamson(group drive)

Forge Shop Tools.

400.	6,000-lb. steam hammer.	Chambersburg Engineer'g Co.
401.	3,000-lb. steam hammer	Chambersburg Engineer'g Co.
402.	2,000-lb. long-stroke steam hammer.	Chambersburg Engineer'g Co.
403.	300-lb. upright helve hammer.	C. C. Bradley & Son.
404.	4-in. forging machine.	Ajax Mfg. Co.
405.	2-in. forging machine	Acme Machinery Co.
406.	2-in. guillotine bar shear.	Hilles & Jones Co.

Boiler Shop Tools.

500.	17-ft. hydraulic gap riveter.	Chambersburg Engineer'g Co.
503.	Four plunger hydraulic sectional flanger.	Chambersburg Engineer'g Co.
505.	Single shear, 60-in. throat.	Hilles & Jones Co.
505½.	Single shear, 26-in. throat.	Long & Allstatter
506.	Single punch, 60-in. throat.	Long & Allstatter.
506-A	Single punch, 16-throat.	Long & Allstatter.
506½.	Single punch, 60-in. throat.	Long & Allstatter.
507.	4-ft. radial drill.	Niles-Bement-Pond Co
508.	Single punch and 25-ft. spacing table.	Niles-Bement-Pond Co.
510.	1½-in staybolt cutter.	Acme Machinery Co.
511.	8-ft. bending rolls.	Niles-Bement-Pond Co.
511½.	12-ft. bending rolls.	Niles-Bement-Pond Co.
512.	Multiple drill, four spindle.	Niles-Bement-Pond Co.
	Flue cutters.	Big Four Railroad.
	Ferguson flue welder	J. T. Ryerson & Son.
	Hartz flue welder	
	70-in. bending rolls.	Niles-Bement-Pond Co.

TWELVE-WHEEL MALLET COMPOUND LOCOMOTIVE FOR NORTH CHINA.

The locomotive here illustrated is one of three Mallet articulated compound locomotives recently built by the North British Locomotive Company, Limited, Glasgow, to the order of Messrs. J. Whittall & Company, Ltd., London, for the Imperial Peking-Kalgan railway of North China. The engine was designed to haul heavy loads round curves of 500 ft. radius and up 3⅓ per cent. grades of considerable length, the axle load being about 16 tons, and the total weight for adhesion 96 tons.

The prominent features of the Mallet type of locomotive are well known, the chief one being the flexible wheel-base construction, there being two distinct groups of driving-wheels, each group operated independently by its respective cylinders. The wheels of the rear or main carrying frames are driven by two high pressure cylinders, and the wheels of the front or motor-truck frames are driven by two low-pressure cylinders. The boiler is rigidly attached to the rear frames at the high-pressure cylinders, thus obviating the necessity for any flexible high-pressure pipe joints, and is further supported at the front end by a prolongation of the rear frame, which, in transferring part of the weight to the front truck, thereby relieves the boiler from all stress. The weight at this point is carried on a sliding bolster fitted with vertical buffer springs. Suitable provision is also made at front and back ends for the support and free expansion of the boiler. The front truck is connected to the main frame through a hinged joint formed by the cast-steel frame cross-stays.

To accommodate the movements of the front truck relative to the rear frame, the receiver-pipe between the high and low pressure cylinders is provided with a ball and socket joint at the hinged end, and a telescopic joint at the front end. There

are also ball and socket and telescopic connections provided between the low-pressure cylinders and the blast-pipe. The lateral movements of the front frame are controlled by a horizontal side-check spring arrangement attached to the under side of the smokebox, and so arranged that it also forms an emergency bolster for meeting any abnormal stresses due to unevenness of the track or in case of derailment.

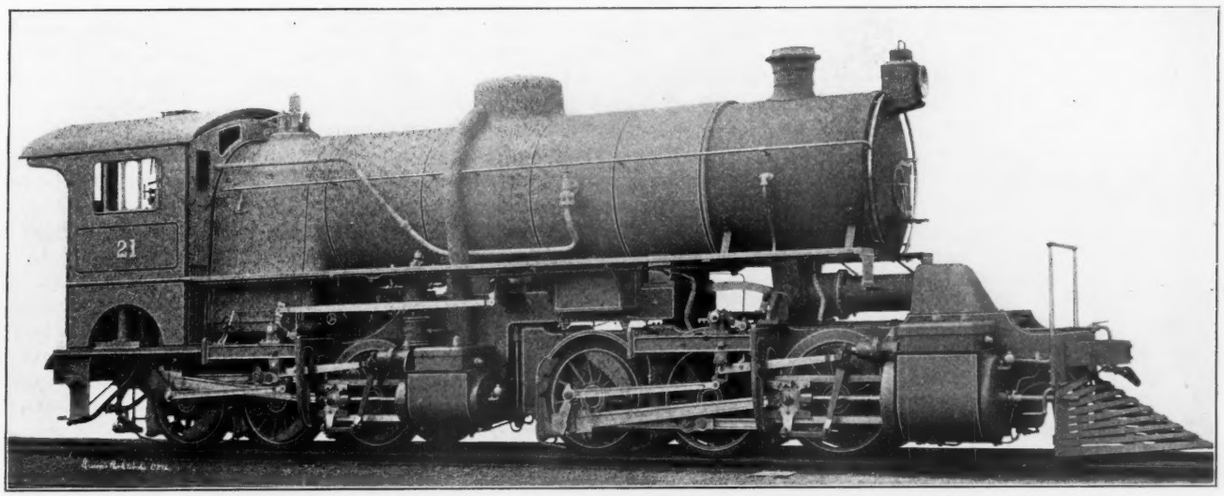
The two high-pressure cylinders fixed outside the rear frames are 18 in. diameter x 28 in. stroke, fitted with Richardson balanced slide-valves and anti-vacuum valves.

pressure reversing shaft lever for varying the relative cut-off periods in the high and low pressure cylinders.

Reversing is effected by a steam-gear controlled by a valve in the cab. One handle only is required to distribute the steam in the reversing cylinder and to lock or unlock the cataract valve on the water cylinder.

The engine is fitted with the Westinghouse "automatic" and also with the Westinghouse non-automatic or "straight" air-brakes.

Air pressure is used to operate the sanding devices, the



Mallet Compound Locomotive for the Peking-Kalgan.

The two low-pressure cylinders fixed outside the front frames are 28¾ in. diameter x 28 in. stroke, also fitted with Richardson balanced slide-valves, anti-vacuum valves, and water-relief valves on each end at the bottom. Both high and low pressure cylinders are provided with steam-actuated drain-valves.

There are no intercepting or change valves used for starting purposes, the Mallet method being adopted, viz., a small auxiliary steam-valve placed in the cab and operated by the driver is connected by a pipe to the receiver.

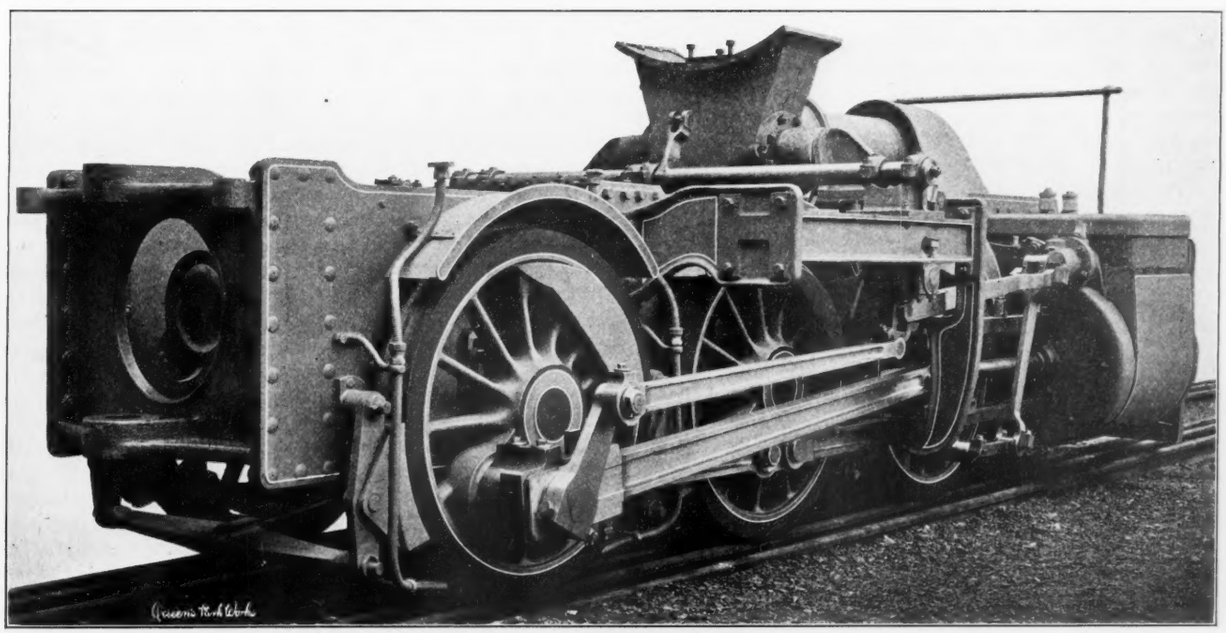
The valve-motion for both high and low pressure cylinders is of the Walschaert type, the details being interchangeable throughout. Suitable adjustments are provided on the high-

use of compressed air for this purpose obviating all trouble from condensed steam in the sand ejectors and traps.

The total wheel-base of the engine is 29 ft. 4 in., but only 9 ft. 8 in. is fixed wheel-base. The center of the boiler above rail is 10 ft.

The cylinder lubrication is provided for by oil-pumps and Furness-lubricators, and the boiler feed by two injectors. The grate is of the finger-bar type, and is operated by steam-gear.

It will be noticed from the photo that the running-boards provided are of the American type. This is in accordance with the North British Locomotive Company's practice for the standard engines of the North China Railways. The tenders



Front Truck of Mallet Locomotive.

for these engines are being built at the company's shops in China.

We append a table giving the leading dimensions of the engine:

Gage	4 ft. 8½ in.
Diameter of high-pressure cylinders	18 "
Diameter of low-pressure cylinders	28¾ "
Stroke of pistons	28 "
Diameter of coupled wheels	4 ft. 3 "
Rigid wheel base	9 " 8 "
Total wheel base	29 " 4 "
Height of boiler center	10 " 0 "
Heating surface, total	2,591 sq. ft.
Grate area	45 "
Working pressure	200 lbs. per sq. in.
Weight in working order	96 tons.

THE LEGAL, ECONOMIC AND ACCOUNTING PRINCIPLES INVOLVED IN THE JUDICIAL DETERMINATION OF RAILROAD PASSENGER RATES.*

BY MAURICE H. ROBINSON,
Professor of Industry and Transportation at the University of Illinois.

(*Concluded.*)

VI.

That the justices of the Supreme Court of the United States appreciated the difficulties inherent in the solution of the problem which the former decision of that court has imposed upon them, is clearly evidenced by the following observation of Mr. Justice Harlan in the case of Smyth vs. Ames. In the discussion concerning methods to be pursued in the determination of the question, "Has the railroad company been deprived of property without due process of law?" he remarked:

"What are the considerations to which weight must be given when we seek to ascertain the compensation that a railroad company is entitled to receive and a prohibition upon the receiving of which may be fairly deemed a deprivation by legislative decree of property without due process of law? Undoubtedly the question could be more easily determined by a commission composed of persons whose special skill, observation and experience qualifies them to so handle great problems of transportation as to do justice both to the public and to those whose money has been used to construct and maintain highways for the convenience and benefit of the people; but despite the difficulties that confessedly attend the proposed solution of such questions, the court cannot shrink from its duty to determine whether it be true as alleged that the Nebraska statute invades or destroys rights secured by the supreme law of the land."[67]

The difficulties which the courts have experienced in the process of applying the principles of constitutional law as expressed in the fourteenth amendment and interpreted in the several cases in which that part of our fundamental law has been applied where states have attempted to fix railroad rates, are due partly to the limitations under which the courts work and partly to the character of the problem which they have undertaken to solve. The nature of these difficulties will appear from a consideration of the following propositions:

1. In the first place, the courts are bound by precedents that make it necessary, at the present time at least, to decide cases brought before them for judicial determination on the basis of the facts submitted by the opposing parties to the suit. Each side of the controversy submits its evidence, so far as it is permitted, and attempts to prevent the submission of evidence that would tend to weaken its position. Consequently, when a case is brought to trial the success of the opposing contestants is somewhat conditioned by their respective abilities in getting their evidence before the court in the legal method. Facts well known to both sides and affecting directly the question at issue are often ruled out because of some neglect on the part of counsel to lay the proper foundation for the evidence or to submit it at the proper time. Such technical methods of procedure, while perhaps necessary and desirable for the presentation of cases before the courts, are quite at variance with the methods followed by the railroad commissions, having the power of individual initiative and direct investigation of the facts and principles involved in the case at issue. Compare, for example, the methods and results in the Nebraska maximum freight rate case with the work of the Wisconsin Railroad Commission in regard to passenger fares. In the former case the evidence submitted by the railroads was accepted apparently at its face value without investigation or examination upon scientific or statistical grounds. In the latter case every allegation of the railroad company was examined in the light of the principles and practices employed in accounting as applied in industrial lines as well as in railroad business. Particularly in point was the method of dealing with the evidence submitted relating to the cost of local as compared with through traffic. The evidence furnished, chiefly by the railroad company, was to the effect that the local traffic cost from ten to thirty per cent. more than the through traffic. The court stated that it was in doubt as to the proper weight to be given the testimony, but as no evidence has been submitted by the government tending to controvert it, the court must accept it as presented and therefore hold that the local freight would be assumed to cost ten per cent. more than the average cost of traffic. Furthermore, in all questions of this character, the railroad companies have an advantage before the courts of considerable importance from the fact that they alone possess the data upon which scientific decisions can be based. To be sure the courts have the power to summon both persons and papers, but in cases involving the consideration of such a mass of statistical data, it is nothing short of a miracle when the attorney for the government or the witnesses are able to call for the statistics or to present the facts that are absolutely necessary to controvert those presented by the railroads and therefore to put the case in its true light. Consequently, the case of the government is presented with such incompleteness as compared with that of the railroads that the court is often forced to give a decision directly opposed to that which would have been handed down had the investigation been made with the thoroughness and accuracy that is possible through a commission. It is entirely safe to say that no business establishment of the size of a modern railroad corporation could be successfully conducted if its selling department were obliged to depend in the determination of its rate policy upon evidence of the character of that which is usually the basis of the important decisions of our courts in the railway rate cases.

2. Even though the evidence submitted were complete and all the facts bearing upon the case were at the disposal of the courts, in those cases where the problem of determining the effect of a reduction of rates upon the earning power of a railroad company is the question at issue, the methods adopted have been so at variance with those employed in modern business affairs that a series of rational decisions was not to have been expected. Even the most callow student of economic law knows from actual experience that except in the most extraordinary cases, a reduction of prices induces an increase in the volume of the sales. The traffic official becomes with long experience a master in the application of this law to the transportation of persons and commodities. When asked for a reduction of rates, his first inquiry is ,"How will such a reduction affect the traffic?" The courts evidently appreciated this fundamental principle, but notwithstanding this, have invariably held that judicial action must be based upon existing facts. In the Dey case Justice Brewer, who delivered the opinion of the court, said: "It is said that it cannot be determined in advance what the effect of a reduction of rates will be. Often it increases business and who can say that it will not in the present case so increase the volume of business as to make it remunerative even more so than at present? But speculations as to the future are not guides for judicial action; courts determine rights upon existing facts."[68] Ten years

*Reprinted by kind permission of the *Yale Review*.

[67] Smyth vs. Ames, 169 U. S., 527.

[68] 35 Federal Reporter, 881.

later this method of determining rights was applied in the Nebraska case. The question was, How shall the court, the facts being at hand, determine the effect of a reduction of 29½ per cent. in rates upon the value of railroad property? The court said: "The first and most important contention of the plaintiff is that if the statutes had been in force during any one of the three years preceding its passage, the defendant company would have been compelled to use their property for the public substantially without reward or without the just compensation to which it was entitled. We think this mode of calculation for ascertaining the probable effect of the Necbraska statute upon the railway companies in question is one that may be properly used."[69]

The doctrine of the courts as announced in the Dey case and applied in the Nebraska maximum freight rate case was thus not only directly opposed to the most fundamental of economic principles and to the established practice of business enterprises, but was even directly controverted in the brief of Mr. James C. Carter, one of the leading counsel for the railroads in the same case. Mr. Carter contended that the regulation of railway rates by the state was unnecessary because the railway traffic managers were aware of the fact that low rates induced traffic and that the increased volume of business more than compensated for the lessened rate of profit and that therefore rates were always sure to be kept close to the cost of transportation. This fundamental economic error of the courts accounts for a considerable portion of their decisions that are evidently based upon assumptions that are contrary to the judgment and experience of the business world. A series of reasonable decisions in such cases can be expected only when the courts have learned to recognize the fact that future economic results can be determined not on existing facts, but only on future conditions.

3. In the third place, the technical difficulties involved in the problem of determining whether a reduction of rates will prevent a fair return upon the investment are, as has been shown in the preceding pages, so complicated, if indeed not unsolvable, in the present condition of railway finance, statistics and accounting, that experts differ widely in methods and results and therefore the supreme court, composed of men trained in the law, cannot be expected to untangle the facts and apply the proper principles and thus reach a wise and equitable decision. No exception is taken to the statement of the principles of law by the courts. In every case the justices seem to have been actuated by the highest ethical ideals and the keenest sense of the rights of the contending parties. "A company is entitled to demand," it was said of the San Diego case, "no more than a fair return on the reasonable value of the property at the time it is being used for the public";[70] and again, "The public cannot properly be subjected to unreasonable rates in order simply that stockholders may earn dividends."[71] Again, particularly in the Reagan cases, the doctrine was affirmed that money wasted in unwise construction or extravagant management could not be taken into consideration in the determination of reasonable rates.[72] It is when it comes to the application of these principles to actual cases that the judicial machinery breaks down. A good example occurs in the Nebraska case. It was shown in the evidence submitted that the schedule of rates fixed by the legislature was on the average 29½ per cent. lower than the published rates. The court accepted the evidence and then assumed that the gross earnings of the railroad company for the preceding year would have been reduced by the same per cent. for the coming year were the reduction to stand. Such an assumption would be realized in the fact only when (1) no increase of traffic resulted from the reduction; (2) the average was a weighted one and the traffic continued to flow in exactly the same proportions at the various rates; and (3) all goods were transported at published rates. Again the statement of the railroad company, showing the cost of carrying the local freight, was accepted without examination. When it is remembered that it is the practice of the railroad companies to separate not much over 25 per cent. of the expenses, and that the remainder is arbitrarily apportioned by the accountants of the company, and further that it is always to the interest of the railroad to make it appear, when rates are reduced, that the business in the past was not unduly profitable, the results were what might have been expected. In this case it was shown by the railroad's statistics that a reduction made by the legislature would reduce the gross earnings to an amount less than the operating expenses. The statute was therefore declared illegal. But even though expenses could be scientifically prorated among states, and between the several kinds of service, the courts would still have to determine (1) the total capital employed by the railroads involved, and (2) the portion of the capital that was devoted to the several states and to each branch of the business. The courts recognized very early the necessity of ascertaining the value of the property of the railroads whose rights were threatened by a statutory reduction of rates, but until the Nebraska maximum freight rate case none but the most general statements were made in regard to the basis of such valuation. In that case a fairly comprehensive summary of the factors to be considered was made, as follows:

"In order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of the bonds and stocks, the present as compared with the original cost of construction, the probable earning capacity of the property under the particular rates prescribed by the statute, and the sum required to meet operating expenses, are all matters to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property."[73]

Even a cursory examination of the above statement shows that the ideas of the court were extremely vague and further that it contains a curious mixture of the "cost of construction, original," "cost of construction, new" and the "earning power" methods of railroad valuation. Moreover, it even qualifies the above statement by remarking that "other matters" may be regarded. It is, of course, unnecessary to point out that any consideration of the earning power under existing rates in determining the value of the railroad is entirely illogical. For the earning power is determined by its schedule of rates and the reasonableness of this schedule is the question before the court. Further, the court in all the cases that have been brought before it for adjudication, where the determination of the value of the property was essential to a proper solution of the question, has never made the least attempt to apply its principles of valuation as outlined above. In fact, a valuation worthy of the name is entirely beyond the capacity or the proper functions of a court. In some of the minor cases it may have made use of a referee, but in all the more important cases, the court has either taken the valuation of the railroad company or, more generally, decided the case without attempting any valuation at all. Again, while the courts have invariably held that intrastate earnings and expenses only[74] may be considered in determining the validity of rates made by state authorities, in no case have the judges even attempted to make the separation necessitated by their decisions. To make such a separation complete it would, of course, be necessary to determine what percentage of the total capital investment within the state was devoted to the use of the intrastate passenger business. Consequently, even though the courts were able to follow out the plan proposed in the Nebraska case and make a valuation, it would be still under the necessity of apportioning that capital to the several branches of the service as previously outlined. The more fully one considers

[69] Smyth vs. Ames, 169 U. S. 528.

[70] 174 U. S., 757. [71] 164 U. S., 596. [72] 154 U. S., 412.

[73] Smyth vs. Ames, 169 U. S., 547.

[74] Smyth vs. Ames, 169 U. S., 466. C. & C. Ry. Co. vs. Tompkins, 176 U. S., 177.

the technical difficulties involved in the judicial determination of railroad rates and the more carefully one reviews the history of past decisions upon this question, the plainer it becomes that the courts are unable to cope with the technical difficulties that are necessarily encountered, and that therefore they must hand over the preliminary investigation that is necessary in order to determine the total investment, earnings and expenses and to apportion the same on some sane and safe economic basis to a commission made up of experts in this field; or they must continue to decide such cases with complacent disregard for the priniples which they themselves have laid down. In the interests of legitimate business as well as those of abstract justice it is to be hoped that they will have the wisdom to choose the former course.

REBUILDING AN INTERLOCKING PLANT.

The accompanying plan and photographs show the arrangement of interlocking signals at Metropolitan avenue, Bushwick Junction, on the Long Island Railroad. From this station the signalman controls the double trolley crossing at this point, and in the summer the lever movements average 3,600 for 24 hours. The plant was recently overhauled and partially rebuilt. The machine has 12 levers and four spare spaces.

Signals 3, 13, 15, 16 and 14 were on wooden posts and wire connected; 2 and 4 were also wire connected, but were on an iron bracket post. Signal 14 was on a separate post from the westbound distant signal for Mount Olivet. Signals 16 and 15 were equipped with mechanical slots. The lead-out from the tower was accomplished by vertical lead-out cranks, mounted on the floor of the tower pit. This pit was always full of water and was usually frozen solid all winter, owing to the bad drainage. Also as there are no street sewers at this point, all surface rain water flowed down the streets and over the tracks.

Signals 16 and 14 are now double arm Style B Union motor signals. Signals 15, 3, 13, 2 and 4 are pipe connected; and 6, 15, 3 and 13 have been put on iron posts. The mechanical slot on signal 15 has been removed and an electro-mechanical slot substituted. This signal is the advance block signal for B. J. and the home signal for M. X. It is controlled from B. J. by a circuit-breaker on a lever which makes and breaks the slot circuit. Signals 16 and 14 are controlled by circuit-breakers on their respective levers.

The location of the pipe lines is shown by broken lines. From A and B to the tower, and from C and E to the tower, also between G and H, the 1-in. pipe is carried in 2-in. oil-pipe under ground. At D the lines which operate 6 and 7 emerge. The reason for there being pipe lines on both sides of the Bushwick Branch track is that there was not room to set four oil crank boxes between tracks in front of the tower. The pipe line could not be extended straight to the bracket post as there is a drain pipe so near the surface that pipe carrier foundations could not be set.

The pit of the tower was torn out and a 3-in x 15-in. plank bolted to the uprights of the machine frame. To this the vertical crank stands were bolted at an angle of 90 deg. to their former position. Connection was made under the former

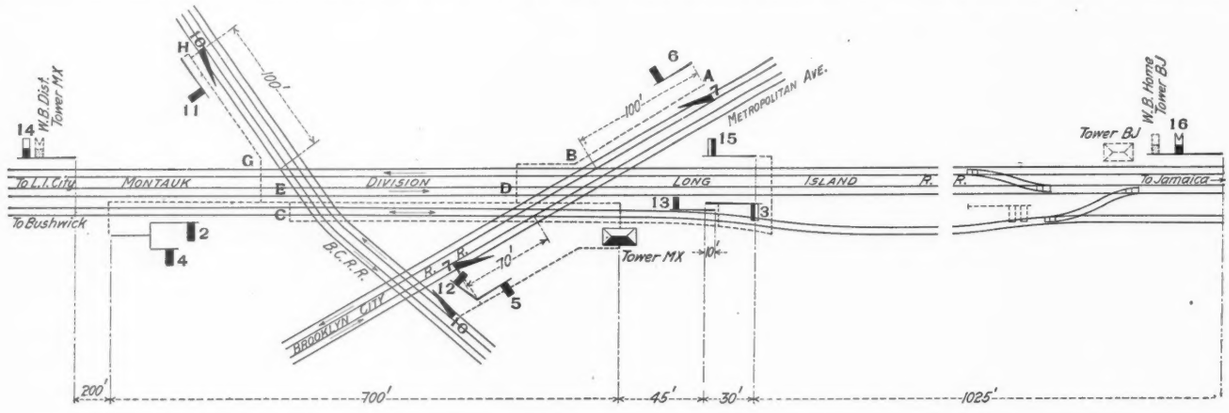


Fig. 1—Interlocking at Metropolitan Avenue, Bushwick Junction, N. Y.; Long Island Railroad.

pit floor to a drain and the whole inside of the tower underneath the machine was floored and walled around with concrete of an average thickness of 6 in.

The lead-out cranks are thus suspended over a concrete basin connected to a drain through an opening one foot square. In front of the tower the lead-out platform of 3-in. x 15-in. planks is supported on three concrete foundations and surrounded, except on the east side, by a concrete wall 6 in. high and 4 in. thick. This wall has an offset in it to accommodate a second opening into the drain. This opening is lined with concrete and extends under the lead-out platform. Beyond the wall to the edge of the ties extends a concrete floor of an average thickness of 2 ft. and in this are embedded two oil-crank boxes, and all the oil pipes, these latter extending through the wall. This forms an absolutely rigid support for

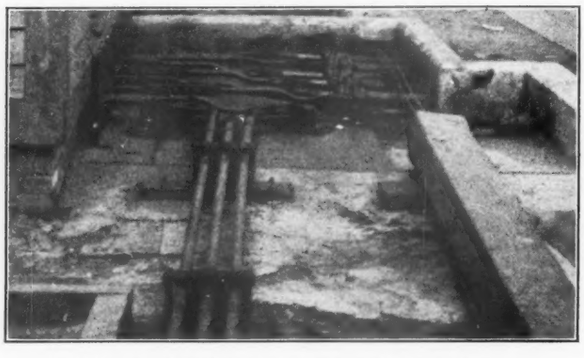


Fig. 2—Lead-out at Metropolitan Avenue.

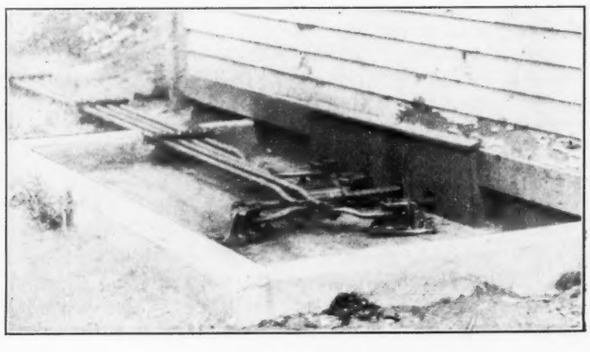


Fig. 3—Back Lead-out.

the boxes and pipes. The plungers terminate in eyes, thereby working on a swivel-joint and doing away with all strain and undue wear on the stuffing boxes. Just east of the lead-out platform is a third connection to the drain.

Since the wall has been built, no water, except that falling vertically as rain, has come in contact with the lead-out, as all the surface flow, which frequently is as much as 2 in. deep, is deflected by the wall and carried off by the third entrance to the drain. Fig. 2 shows the front lead-out. The boxing which appears contains the rods which operate the crossing gates.

Fig. 3 shows the back lead-out platform, surrounded by its concrete wall. The water behind the tower frequently reaches a depth of 3 in. The whole pipe line used to be frozen in solid every winter, but is now raised above high-water mark.

Signals 5 and 12, situated at a street corner, are on a single post, their spindles being at an angle of 90 deg. from each other.

Signal 6 had to be set in the sidewalk and it is worked by pipes laid underground. It is an inside-connected 90-deg. signal. The base, which is embedded in the ground, is an oil-box containing a crank to operate the up and down rod, and has a nipple into which is screwed the 2-in. oil-pipe used to operate it.

MOVING LOADS ON CONCRETE BRIDGES.

BY DANIEL B. LUTEN,
President National Bridge Co., Indianapolis, Ind.

In addition to the advantage of permanence with freedom from painting, inspection and repairs, concrete bridges have another advantage that is frequently overlooked, in the low ratio of live load to fixed load.

The concrete bridge shown in the accompanying views was completed in 1907 for the Ohio Electric Railway, crossing the Maumee river at Waterville, Ohio, 15 miles southwest of Toledo. It consists of 12 spans of 75 to 90 ft. each, with 16 ft. roadbed, 45 ft. above low water. One of the main 90 ft. spans of this structure contains approximately 22,000 cu. ft. of concrete and earth filling, weighing nearly 1,500 tons. If the entire span were loaded with 5,000 lbs. of live load per lineal foot, amounting to a total load of 225 tons on the span in addition to the fixed load, this live load would amount to an increase of only 15 per cent. above the fixed loading, omitting impact. Adding another 5,000 lbs. per lineal foot would increase the total loading to 450 tons, an amount far in excess of present day possibilities, yet amounting to an increase of but 30 per cent. over the fixed loading.

Consider now the effects of similar loading on a steel truss bridge of 90 ft. span. The weight of the steel bridge for a loading of 5,000 lbs. of live load per lineal foot, would be less than 100 tons. In comparison with this fixed weight, the 225 tons of moving load resulting from the 5,000 lbs. per ft. is an increase of over 200 per cent.; and the addition of another 5,000 lbs. would cause an increase of another 200 per cent.

A steel bridge designed for railroad loading is a far heavier structure than one designed for highway loading, because of the great excess of live load over fixed load in such a structure. In concrete bridges the highway and railroad bridges belong more nearly in the same class, and a great increase in the live load results in a very small added cost. In fact, most concrete highway bridges will safely carry railroad loads, since that means at most an increase that will hardly exceed 50 per cent. of the fixed weight of the span. If this seems an extreme statement it is only because the reader is still thinking in terms of steel bridges. On account of the great disparity in weight between railroad and highway bridges of steel, most designers of railroad bridges have a feeling akin to contempt for highway bridges. But when concrete bridges are under consideration, this feeling requires revision to suit the wholly different relations between the two classes of bridges.

The life of steel bridges on railroads has rarely exceeded 10 or 15 years, not so much because of deterioration as because the rapid and uniform increase in railroad loading has exceeded the assumed loading. Here again the greater proportion of fixed loading of the concrete bridge works a great saving in the life of the structure. For in the case of a concrete bridge designed say for 5,000 lbs. per lineal foot, the loading may in general be doubled, trebled, or quadrupled, and increased far beyond the ability of our present roadbeds to sustain, without doubling the total load on the span. And when it is remembered that concrete increases in strength with age, and that such structures are usually thrown open to traffic at 30 days or less, it is not too much to say that a concrete bridge built for present day traffic will sustain any future increase in traffic and will never need to be replaced by a heavier bridge.

Because of the monumental nature of the bridge across the Maumee, and because an excessive load could be provided for at a merely nominal increase in cost, this bridge, although intended for electric traction with maximum car loads of

Maumee River Bridge; Ohio Electric Railway.

100 tons on two trucks, was designed for 10,000 lbs. per lineal foot, and is guaranteed with surety bond for that loading. The bridge contains but 9,200 cu. yds. of concrete and 100 tons of steel rod reinforcement, and cost $77,000. It was designed by the National Bridge Company of Indianapolis, under the Luten patents.

PRESIDENT RIPLEY ON THE FUTURE OF THE ATCHISON.

E. P. Ripley, president of the Atchison, Topeka & Santa Fe, contributes to the October number of the *Santa Fe Employees' Magazine* an article on "The Future of the Atchison." This magazine in the previous month reprinted an article on the Atchison by Frank H. Spearman that appeared in *Scribner's* in 1904, and Mr. Ripley in his article says:

"Mr. Spearman ventured the suggestion that a combination with the Rock Island would not only greatly strengthen the Santa Fe's position in the West, but would also make it possible to materially reduce the running time of trains between Chicago and Los Angeles. At the time his article was written (1904) such a suggestion might have been a good one, but now that the Santa Fe has built the Eastern Railway of New Mexico (the Belen cutoff) it can land its trains in Los Angeles just as quickly as it could by any joint arrangement with the Rock Island. Combination with the Rock Island for any other purpose would probably be out of the question, on account of sentiment against the consolidation of competing lines, and laws have been enacted recently which would perhaps make such a consolidation illegal.

The other suggestion made by Mr. Spearman—the purchase of the Atchison by the Pennsylvania—must also, I believe, fail

of ever being realized. Should the Pennsylvania or any other New York-Chicago line ever acquire control of the Santa Fe, it would mean that line and the Santa Fe against all other railroads. Instead of receiving freight and passenger business from every eastern line as it is now doing, the Santa Fe would receive at Chicago business from but one road, for the competitors of that road would take a great deal of pleasure in turning over to the competitors of the Santa Fe all the business possible, and likewise the competitors of the Santa Fe, who now turn over business to all Chicago-New York lines, would see to it that the ally of the Santa Fe in the East received only such business as could not be turned over to some other road. There would be such a rapid falling off of the business received from connections as to make a combination with a New York-Chicago line altogether unprofitable and undesirable under existing conditions.

"The Atchison is the largest independent railroad in the world and, as Mr. Spearman aptly puts it, 'is the one big, red apple still left on the railroad tree.' Year by year it continues to grow bigger and redder, gradually attaining such proportions as to make it practically impossible for any single interest to obtain control. I have little fear that the future of the Atchison lies in a combination with any other Western road, in its absorption by an Eastern company or in its domination by any single interest.

"My belief is that the future of the Atchison is indissolubly welded with the future of the country that it serves. We now operate in twelve states and territories, containing hundreds of thousands of acres badly in need of additional transportation facilities. The Santa Fe has always stood ready to supply these needs as soon as conditions would justify a fair return on the money invested, and frequently thousands of dollars have been invested where no adequate returns could possibly be made for many years. A dozen branch lines in Kansas should be extended; Oklahoma should have hundreds of additional miles of railroad, as should also Texas; but when these states deliberately pass laws to increase the operating expenses of railroads and decrease their earnings to such an extent as to make it a most difficult thing to pay a small rate of interest on the money invested—when they resort to such measures as are well calculated to shake the confidence of the investing public to such an extent as to make it a matter of great difficulty to raise money for improvements and extensions—railroad building in these states must stop, not in retaliation, but as a natural sequence. In the year ending June 30, 1907, the most prosperous in the history of the company, the earnings were but 6½ per cent. on the total capitalization. In the year ending June 30, 1908, they were approximately 5½ per cent. Obviously this is not a safe margin, especially if we are to keep up the property and make those improvements which our patrons demand.

"Before the blighting influence of the panic was felt last fall I made the remark that I would not advise the Atchison to spend any money for construction purposes in those states that had been actively engaged in passing drastic anti-railroad legislation. I was grotesquely misquoted and sarcastically censured for my statement, which was not made in a spirit of vindictiveness, but which was merely the conclusion of a business man acting in the best interests of the property intrusted to his care. If by any good fortune there should be placed at my disposal a fund of $20,000,000 for the purchase of roads already built or for the construction of new lines or extensions, I could make my choice in twelve states in which the Santa Fe operates, and if your readers could see all the propositions that are from time to time presented to a road like the Santa Fe there would be no doubt in their minds as to the number of really desirable places in which the money could be invested. I would be false to my trust should I not endeavor to pick out those which offered the best and safest returns, just as one would be false to himself if he did not invest his savings in such a way as to bring the best and safest returns.

"The construction of several hundreds of miles of road in Oklahoma had been recommended and work had already been commenced when the two-cent law and other anti-railroad legislation made it not only expedient, but absolutely necessary to drop the undertaking, and since then neither the Santa Fe nor any other road has built a mile of railroad in that state—a purely business-like and logical outcome. The short line southeast from Texico, N. M., is awaiting construction, as are also several other projects, but who shall say when work will be commenced? The Atchison stands more than ready to undertake the work just as soon as it can produce the money and conditions in the country warrant a fair return on the capital invested. These conditions are subject to the will of the people.

"If the people wish legislation which makes it impossible to extend or improve the Santa Fe, we must simply operate as best we can the property we now have, without thought of extension and very little chance for improvement, but I have sufficient faith in the justice and business aptitude of the people in our Western states to feel that they will not suffer themselves much longer to be hoodwinked by craft politicians who have gained political preferment by their ability to harass the railroads in times of prosperity.

"I have desired to live long enough to see the Santa Fe double-tracked at least as far as Dodge City and Wellington, as well as between Albuquerque and Ash Fork, or perhaps beyond, with ample equipment to care for a much larger traffic than it has ever carried. Whether or not this dream shall be realized depends mainly on the people along the line. If they want good service they must pay for it, as they would pay for any other good article. We can give them the very best, but not unless we can get our shareholders to provide funds, which, of course, they will not do under present conditions.

"I would, therefore, repeat that not in a western consolidation, not in an eastern combination, nor in the control of the road by a single interest lies the future of the Atchison, but rather in the wishes of the people living in the territory we serve, upon whose decision must depend our ability to expand and improve."

SHOP NOTES.

At the Decatur car shops of the Wabash they are doing some remarkably fast work on steel-tired tender wheels, with a new Putnam wheel lathe which has shafts and gears almost as large as those of driving wheel lathes used in former years. The lathe is driven directly by a 30-h.p. motor and has six mechanical changes of speed. On a measured test, 22 pairs of worn 33-in. steel-tired wheels were turned on tread and flange in 10 hours and 41 minutes. The treads were reduced on an average ⅝ in. in diameter. This performance is due not only to the unusual power of the lathe but to the use of broad cutting tools made of high-speed steel.

The wheel borer in this shop also has an enormous output, having bored 160 cast iron wheels in 10 hours. This machine is driven by a 20-h.p. motor, and the head of boring bar is fitted with a number of cutters, instead of the single one generally used. The axle lathe is driven by a 30-h.p. motor direct-connected, and the gearing for mechanical changes in speed is housed in a tight case so that the gears can run in oil. This lathe turns out 25 finished axles in 10 hours.

At the same shops electric current is used for heating a small oven for drying lacquered brass work for coach trimmings. A dozen 16 c.p. incandescent lamps are arranged on a low shelf in a sheet iron closet with a perforated sheet iron shelf above, and the brass pieces are laid on this shelf. The lamps supply sufficient heat at an even temperature and the cost of the current is so low that the convenience is justified. In the cabinet shop electric current is used for heating the glue pots. The water bath acts as a resistance between

two poles and sufficient heat is obtained by a small amount of current. When current is generated by cheap fuel at a small cost the use of electricity for such purposes avoids the use of live steam which is often conveyed through a long line of pipe. Some of the electric manufacturing companies now make special fixtures for glue cookers.

Several years ago it was fashionable to pipe roundhouses for oil to be used in firing up engines, and oil fire kindlers of various kinds were used to good effect. A cheap and simple method is now employed by the Wabash, the Chicago & Eastern Illinois and some other western railroads, which use shavings from the planing mill saturated with crude oil, a large pail full of the oily shavings being sufficient for a large firebox. Coal is first spread over the grate to the thickness of 3 in. and this is covered about an inch deep with the saturated shavings. These are lighted and the blower put on, when the coal soon ignites.

THE FREIGHT PROBLEM ON MANHATTAN ISLAND.*

BY HENRY J. PIERCE,
Vice-President of The Amsterdam Corporation.

The very geographical surroundings which have made Manhattan island great as a port for water borne commerce, isolate it from direct connection with eight out of ten railroads centering in this vicinity. Twenty-five years ago it seemed as though the great harbor facilities for ocean shipment and for lighterage afforded by Manhattan island would be sufficient for an indefinite time to come; but the tremendous development of our country has poured upon this island so great a population and such a volume of the nation's products, as to have absorbed all the water front and to have made this spot the most congested for movement of people and goods that exists anywhere in the world.

The great bulk of water borne commerce has come naturally to Manhattan until, with available space all occupied and more commerce crying for room, congestion forces steamship lines to turn to other ports. We see the finest port in the world, open all the year to the commerce from every sea, cut off by water from rail connection and from the richest market in the world except for the tracks of the New York Central and the New York, New Haven & Hartford roads. The threshold of water keeps the various systems waiting with their tracks just outside the door.

Last year out of a total value of $3,600,000,000 foreign commerce of the United States, more than $1,600,000,000 passed through the port of New York. In 1900 New York City produced 11 per cent. of the total value of the manufactured products of the country. According to testimony before the New York Chamber of Commerce, the annual total tonnage of New York in 1900 exceeded 100,000,000 tons. Congestion in handling this vast tonnage, with resultant high terminal costs, is gradually decreasing the rate of growth of New York City as shown by the exports and imports having declined from 50 per cent. of the total in 1899 to 45 per cent. in 1907.

The business transacted on Manhattan island between the Battery and Forty-second street represents, directly and indirectly, fully one-half of the commerce of the country. Into this little space two miles wide by four miles long pours daily a large proportion of the surrounding population of five million people, while into the same limited area there is daily received and delivered by water and rail carriers the enormous amount of over 100,000 tons of freight. With the completion of the enlarged Erie canal and the natural growth of population and of commerce, the congestion of people and of freight on this island will create in a few years a situation so unbearable that, unless remedied, New York will be forced to share her supremacy with other Atlantic cities. In other words, Manhattan island has just about reached its utmost capacity for doing business.

*From an address before the New York Traffic Club, October 27, 1908.

A leader in the affairs of the world cannot stand still. If so, the onward march of events transforms a leader into a laggard. If Manhattan is to maintain its lead, it must go forward. It cannot fold its hands in its lap, block its streets until they become impassable to traffic, while other ports win away the commerce that belongs here. The freight problem of New York City is a world problem of importance to the markets of the whole earth.

Surface, underground and elevated railroads, together with bridges over and tunnels under the rivers have provided facilities, which even now are over crowded, for the transportation of passengers. The sidewalks can no longer contain the human tide of travel going and coming from work morning and evening. The street cars, drays and other vehicles fill the streets from curb to curb, and the ever increasing congestion imperils safety, causes discomfort, retards movement of pedestrians and of street cars, makes cartage slow, and creates a congestion so unbearable to people, so costly to the movement of freight, that it imperils the further growth of New York City and seriously interferes with the prosperity of its citizens.

While the question of handling freight more quickly and economically has been under consideration for years past by the municipality and by committees of the Chamber of Commerce and other organizations, yet the most archaic methods still prevail. The west side problem of congestion in freight handling is highly injurious to the interests of the city, and no progress is being made to obviate tracks at grade, and long drawn out litigation faces the two parties to the problem—the city and the New York Central Railroad, who, however, are apparently anxious to reach an amicable agreement. As far back as 1867 a four-track railroad on the water front was suggested, with two tracks for passenger purposes and two for freight, but along West street still trundles the horse-car for passengers, and on the same tracks the freight cars of the New York Central Railroad are pulled along slowly by dummy engines preceded by boys on horses waving the red flag of danger.

Along the North river south of Seventy-second street, 30 per cent. of the total lineal feet is used by eight railroads, exclusive of ferries, and 23 per cent. is used by 12 foreign steamship lines. On the East river south of Forty-fourth street 10 per cent. of the total frontage is used by six railroads, exclusive of ferries.

(Mr. Pierce at this point in his address gave an abstract of the freight subway plan, fully covered in the report by Mr. Wilgus which was printed in the *Railroad Age Gazette* Oct. 16, p. 1150.)

The docks around the water front will have connection with the belt line, and spurs will extend under the sidewalks direct to the buildings occupied by the principal shippers and receivers of freight in the congested districts. Coal will be delivered to the cellars of all large buildings, and ashes removed. It is proposed to establish transfer stations at intervals of one-half mile, where the car bodies bearing classified freight would be placed upon auto trucks for street delivery to points where the amount of freight would not justify lines being extended under the sidewalk.

The tracks are so arranged that there are no grade crossings, and there will be no obstruction to the smooth, quick movement and delivery of freight. The 10-ton cars of the Terminal Railroad can be operated over its own tracks and those of connecting railroads, without transfer of freight, direct to and from the factory towns within a radius of 50 miles of New York. These cars will be of a size and capacity closely approaching the freight cars used in England and on the Continent of Europe.

It is estimated that these terminal facilities will care for fully 90 per cent. of the railroad freight destined for Manhattan island. Careful study of piers and conferences with the managers of ocean carriers demonstrates the great benefit of the new system to the quick loading and unloading of

ocean steamships. It is interesting to note that of the total amount of freight handled on Manhattan island, 75 per cent. is incoming and but 25 per cent. outgoing, and therefore three-quarters of the cars would return to New Jersey light. Reliable figures obtained from railroads, large shippers and cartage companies give the total present average cost of delivery of freight from the Hackensack Meadows in New Jersey to the store in Manhattan island as $2.25 per ton, and of this the average cost of cartage on Manhattan island is 80 cents per ton. Careful estimates show that after a fair return has been made to the capital invested, savings would be effected by the proposed new terminal facilities of over $12,000,000, to be shared by the railroads, the shippers and the municipality. The plan, if carried out, would release fully 30 per cent. of the water front space now required for lighterage.

The municipality will welcome any solution that promises a reduction in the cost of paving, repairing and cleaning streets. Refuse and street sweepings would be cared for by its removal in freight subway cars, instead of by cart and scow. The handling of the down-town mails, the disposal of excavation material for new buildings, the saving of docks now

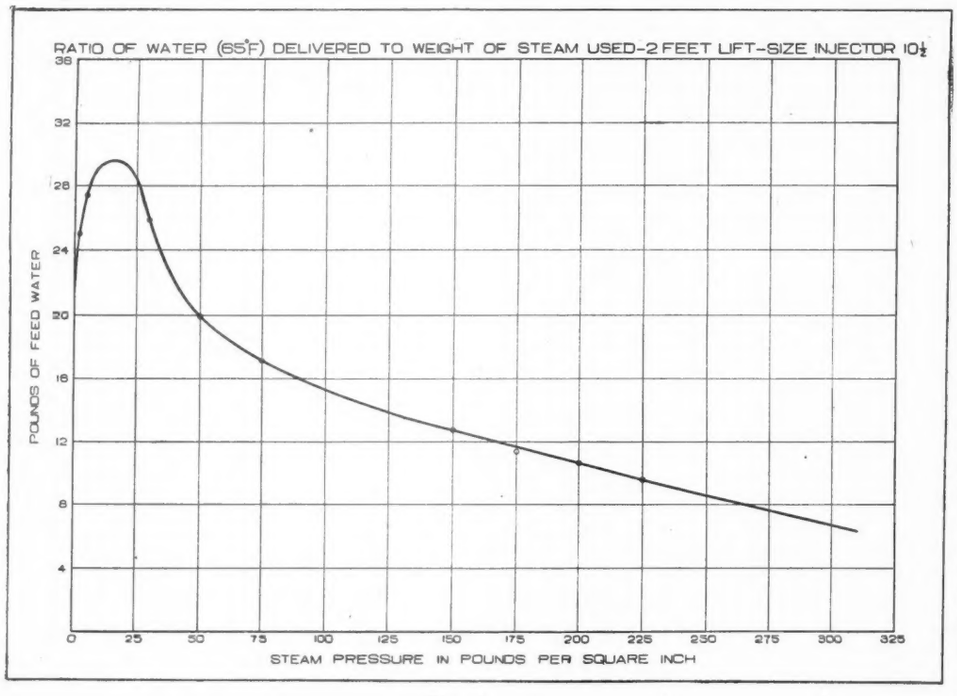


Fig. 1.

devoted to the disposal of waste material are other matters of public interest in the plan.

The freight tubes and subways will be relatively much less costly than the under-river tubes and municipal subways with which New York is already familiar, for the reason that our cylindrical subaqueous tubes will be only a little more than 11 ft. in diameter and our land subways, which within the city will run directly beneath the sidewalks, will be only 8½ ft. wide and the same in height.

Whether the freight subways shall be created is a question of necessity, of practicability, of public comfort, of results, of whether there is any better plan, and finally, of business.

In this Terminal Company there should be created a public utility upon such a foundation of fairness toward all interested that none shall be unduly favored, but all shall benefit. That the capital invested be properly compensated; the railroads be fairly treated; the shippers receive reasonable rates and best of service; the city its fair return in taxes; the people generally great direct and indirect benefits and comforts; and finally, that such splendid and unequaled freight terminal facilities be established upon Manhattan island as will entrench the port and city of New York more securely than ever in its position as the commercial stronghold of the American side of the Atlantic.

The land and water commerce of Manhattan have grown to the limits of existing facilities. The solution means a new metropolis, a greater Manhattan, a city of commerce that heretofore has not been possible, because, beneath the crowded surface of busy life, a new city can be created—a city devoted to business, a city given over to making greater the city above it, a city of subway and track, and traffic that moves to and fro, for the convenience of a city, the service of a nation and the needs of the world.

SELLERS' NON-LIFTING 1908 INJECTOR.

The William Sellers Company, of Philadelphia, has recently brought out and placed upon the market a new type of restarting, non-lifting injector that possesses the valuable feature of being absolutely restarting under a wide range of steam pressures and feed-water temperatures, besides wasting a minimum of water at the overflow. In addition to these two essential qualities, the water supply pipe is automatically closed whenever the steam is shut off, so that leakage with the consequent danger of tank drainage is entirely obviated, and the amount of water delivered automatically increases or decreases with the rise or fall of the boiler pressure, without wasting at the overflow.

The means that have been employed to accomplish these ends and the methods of operation will be readily understood from an examination of the accompanying engravings.

With the lazy cock open and the injector at rest, water fills the suction pipe, 23-B, up to the check valve, 236, which is pressed down against its seat by the head of water and the spring, 235, set in the hollow stem above it. This check valve, therefore, prevents any leakage of water into the injector with the resultant waste at the overflow.

To start the injector it is merely necessary to admit steam to the steam pipe, 19-C. From the lower end of this pipe the steam flows not only into the nozzle, 3, but passes down through the passage cored at the left to the space beneath the piston, 237. The pressure thus exerted at this point raises the piston and pushes the check valve from its seat, opening the passage for the free flow of the water to the injector.

It will be noticed that the steam nozzle is made double or with an annular nozzle about the main inside one. The water from the supply pipe first comes in contact with the jet from the annular nozzle, and receives its preliminary impulse. It thus flows with an increasing velocity down into the combining tube, where it is caught by the steam from the main or forcing nozzle and given its final impulse that drives it into the boiler.

In operation the starting is accompanied by a single brief spurt of water from the overflow that is insignificant in amount and is probably never more than a few tablespoonfuls.

This deals with the injector when working at full capacity. In case it is desired to cut down the amount of delivery, it can be done by lowering and so closing the cap that sets over the suction valve 236. It will be seen that this cap is carried

by a stem, upon which a very coarse pitch screw is cut, so that a quarter turn of the stem serves to move the cap through the whole of its travel. By lowering this to a greater or less extent, it is evident that the source of supply can be cut down indefinitely, and when entirely closed there is space beneath for the valve to rise to its full height without striking.

There is, of course, for all pressures and for all feed water temperatures a minimum below which the injector will not work. But it is interesting to note that the only outside indication that the injector is not working to its full capacity is that when starting there is a somewhat greater escape of steam, not water, at the overflow than there is when everything is wide open. When working at minimum capacity under a full head of steam there is no overflow, and experiments have shown that the jet, as it leaves the combining tube and crosses the opening to the overflow that is open to the atmosphere, has a density of about 2 instead of the normal unity, and a velocity of about 600 ft. per second instead of 180 ft., and that the temperature is about 250 deg. Fahr. A set of conditions that fully explain the condition of the jet and what has become of the uncondensed steam. It should be borne in mind that the normal position of the overflow is open.

Incidentally attention is called to the action of the spring 235 that assists in the prompt closing of the check valve. It will be seen that it serves the double purpose of closing the valve and carrying a part or all of the weight of the stem with its attachments leading to the cab. One of the advantages of a quick opening valve in this position is that a guide plate can be placed in the cab and marked "Open" and "Shut," so that the driver is never at a loss to know exactly the position of the valve in the suction pipe and whether or not the water can flow freely to the injector.

The restarting principle is self-evident, for so long as there is water in the suction pipe 23-B, it will flow to the nozzles and once there it must be driven to the boiler if it does not appear at the overflow, so that if the water becomes low in the tank and surges to and fro, so as to break the injector, then the moment the suction pipe fills again, the action restarts, regardless of the brevity of the interval between interruptions, for the operation is not at all affected by the temperature of the walls.

Elaborate tests of efficiency of the apparatus have been made, and it is through these that a still further improvement was made. Referring to the diagram of the maximum and minimum capacities, it will be seen that the line of maximum capacity for the different steam pressures, rises on what is approximately a true parabolic curve, as it should, and then drops away in the same manner. When the features thus far set forth had been first put into operation is was found that while the rising curve to the maximum curve was similar to that shown, it fell away very abruptly before the present maximum had been reached. It was noted at once that this indicated an abnormal condition of affairs and steps were taken to remedy it.

A vacuum gage was attached to the overflow chamber sur-

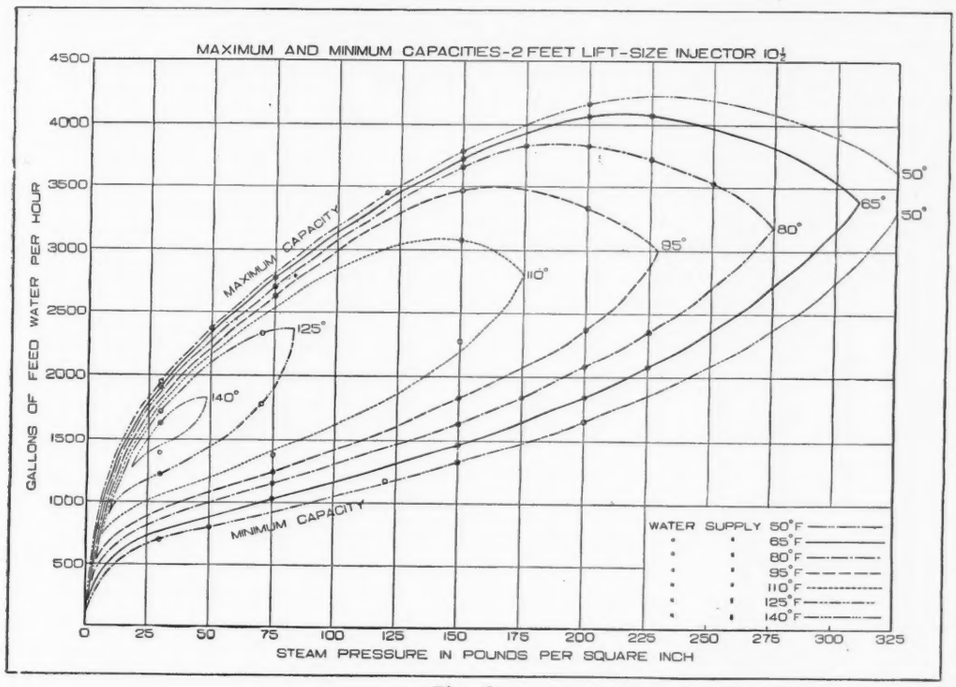


Fig. 2.

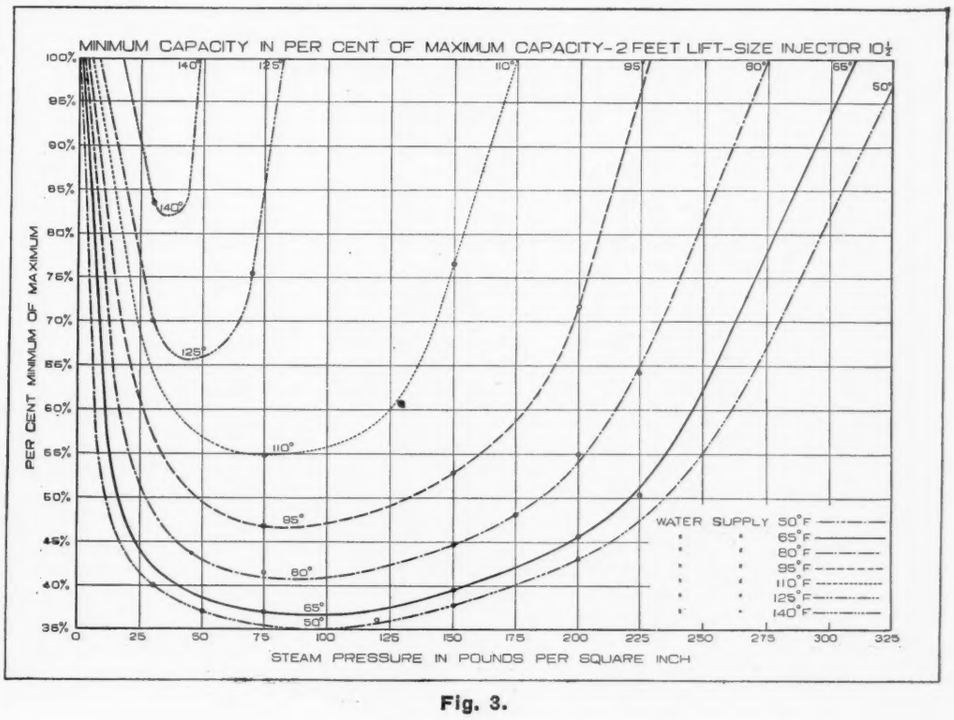


Fig. 3.

rounding the combining tubes, and it was found that during the conditions of working below the maximum capacity, this vacuum from 3 in. to 5 in., but as soon as this maximum was reached an increase of steam pressure caused an abrupt rise to 22 in. just as it caused an abrupt fall in the delivery. This indicated that there was a deficiency of the water supply. If, then, the curve of maximum capacity was to be made normal, there must be a supplemental supply as the steam pressure was raised. As this produced the vacuum referred to, the latter was taken as the best means of accomplishing the object. It was known that if water could be brought to the overflow chamber, it would be caught and carried into the delivery. To accomplish this, a passage from the suction was cored around the nozzles and into the overflow chamber as indicated by the arrow at the right. This passage was closed by the weighted valve 231, that seated in the direction of the flow of water. A careful examination of this valve will show that just below the piston portion that fits into the cylinder above, there is a narrow shoulder. This is so proportioned

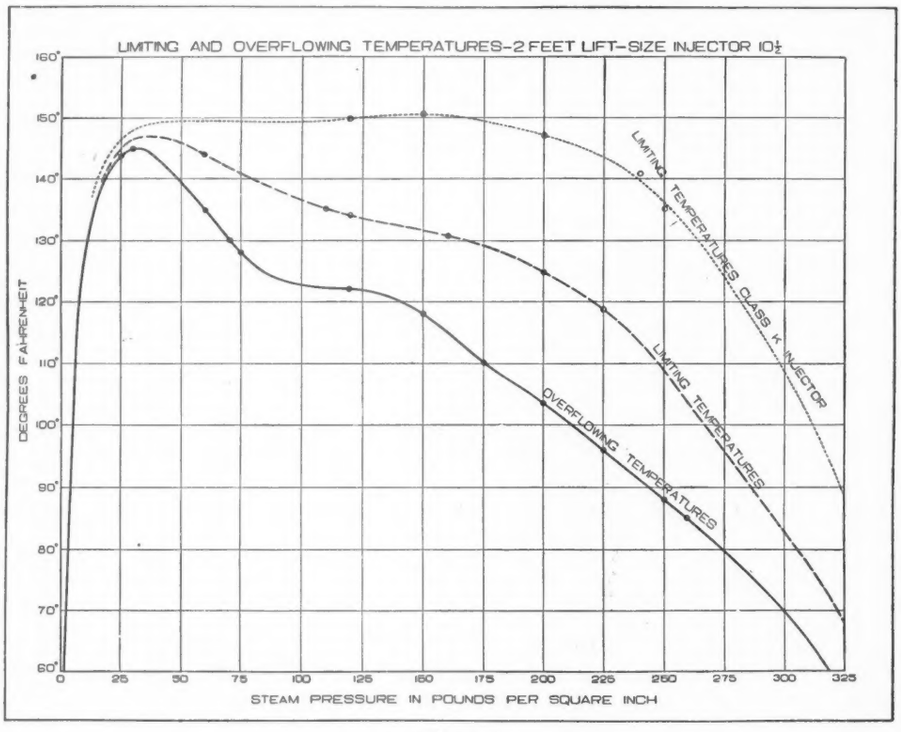


Fig. 4.

that the head of water acting on it just fails to lift the valve under ordinary conditions of action. But when the vacuum in the overflow chamber rises above the proper point, indicating deficient water supply, a similar vacuum is formed above the valve through the hole in the center, and the water pressure lifts it and holds it open while the supplemental water supply is drawn into the overflow chamber and thence into the combining tube in quantities sufficient to make up the deficit that would otherwise exist, the delivery is correspondingly increased, and the diagrams given are obtained.

The circles on these diagrams indicate the results of experiments and are interesting as showing the range and performance of the injector. These show that the capacity increases with the steam pressure up to a certain point and then falls away until it meets the line of minimum capacity, beyond which it ceases to act with the overflow open. If, however, the overflow is closed and a pressure thus developed in the chamber, the capacity will be raised. But this is an abnormal state of affairs and is not considered in the regular ratings. It will also be seen that the capacity and range varies with the feed-water temperature. The lower the temperature the greater the maximum and the lower the minimum capacity. The lower the temperature, also, the wider will be the range of steam pressures under which it will work. For example, with a feed-water temperature of 65 degrees Fahr., the injector will work at from just above zero to about 310 lbs. pressure, while at 140 degrees temperature the range is from about 20 lbs. to 49 lbs. pressure. By throttling the water supply the full range can be obtained, as for example at 200 lbs. pressure with water at 65 degrees, the delivery can be made to range from about 1,800 gals. to 4,100 gals. per hour, and this minimum could be still further reduced by throttling the steam.

The ratio between minimum and maximum capacity is shown on the diagram of the minimum capacity in per cent. of maximum capacity, and it will be seen that the general contours of the lines bear a relationship to each other in strict accordance with the lines of capacities.

Another set of lines show the limiting and overflow temperatures. These are plottings of the feed-water temperature at which the injector overflows at the various steam pressures. The solid line indicates the limits of this occurrence when the overflow valve is normally open, and the dotted line of limiting temperature is that at which the phenomenon takes place with the valve closed; showing the increased range of action that is available in case of emergency, as when the water in the tank may have been accidentally excessively heated.

A final diagram shows the amount of water at 65 degrees that is delivered per pound of steam consumed. This may be taken as the efficiency curve of the apparatus. It rises rapidly from zero to about 29 pounds of water per pound of steam at 20 lbs. pressure, and then falls away until at 200 lbs. pressure the delivery is about 10½ lbs. per pound of steam.

These diagrams are not only interesting as showing the characteristics of operation of this particular injector, but as indicating the possibility of the close agreement between theoretical and actual efficiencies in the forms of curves produced.

Thus, we have seen that the curve of the increase of capacity with the rise of steam pressure is nearly parabolic. The increase in the velocity of the flow of water under increases of head follows the same law, and here we have practically an increase of effective head with the increase of steam pressures. And, as is usual with effective mechanisms, it is exceedingly simple in construction, with nothing to get out of order or displaced. The tubes are fixed, the valves are readily accessible, and do not need any extra refinements in adjustment. The lifting piston 237 has only end contact with the stem of the valve above and need not even be in alinement in order to work perfectly. The slight leakage past the grooves insures a flow of condensed water from the steam pipe 19-C that will keep the parts warm and prevent freezing so that no trouble of this kind has been experienced at all. It is held to the frames by three bolts and is out of the way, and so frees the cab from the incumbrance of two large pieces of apparatus for which there is little room with the attachments that must necessarily be put on the boiler head.

General News Section.

The oldest railroad station in the world, according to the *Mexican Herald*, is that at Cuautla, on the Interoceanic, which was built in 1675. It was a church, but it was vacated by the friars in 1865, when the property of the church was transferred to the state. It was bought by the railroad company in 1890.

The following railroads, after pleading guilty, were fined in the United States district court at Leavenworth, Kan., for violating the 28-hour live stock law: Atchison, Topeka & Santa Fe, $700 on three counts; Chicago, Rock Island & Pacific, $6,850 on 53 counts; Northern Pacific, $600 on four counts, and St. Louis & San Francisco, $1,200 on 11 counts.

It is said that at the annual meeting of the stockholders of the Cincinnati, New Orleans & Texas Pacific it was decided that closer relations ought to exist between officers, directors and stockholders of the road. It was therefore determined that a regular monthly meeting of the directors shall be held in Cincinnati, and that stockholders and officers having questions to ask of the directors shall submit them then.

F. W. Whitridge, Receiver of the Third Avenue (Street) Railroad, New York City, has sent a letter to the bondholders, asking them to assist him in making the road profitable. Addressing them as "the real owners of the property," he suggests that they shall patronize the cars of the company whenever they can, and that when on the cars they shall look out for the interests of the property, even to the extent of "spotting" dishonest conductors.

The United States Civil Service Commission, will, on November 17, hold examinations in the principal cities throughout the country of candidates for appointment as special examiners for the Bureau of the Corporations, Department of Commerce and Labor. This department wants men, at salaries from $900 to $3,500 yearly, to take part in the work of investigating corporations. The function of the bureau is to study industrial conditions as found in large corporations and "trusts" engaged in interstate commerce.

Counsel for the Oregon Railroad & Navigation Company has filed a brief in the Washington Supreme Court, attacking as confiscatory and unconstitutional the Washington state law imposing a penalty of $250 for every day railroads fail to make physical track connections ordered by the State Railroad Commission. It is stated that under eight orders issued by the Commission $3,000,000 in penalties already have accrued against the Oregon Railroad & Navigation Company, the Northern Pacific and the Spokane & Inland Empire.

The Post Office Department has ordered that the New York Central and the Lake Shore shall be paid for handling the mails between New York and Chicago on the basis of the short line mileage by the Pennsylvania lines. It is said that the department intends to require all compensation for hauling mails to be readjusted on the basis of short line mileage. This would cause a large reduction in the revenue of the railroads for carrying the mails. The distance from New York to Chicago by the Pennsylvania is about 60 miles shorter than by the New York Central.

The order issued by the Interstate Commerce Commission some weeks since, directing the Delaware, Lackawanna & Western to assent to the construction of a track to connect its line with the Rahway Valley railroad at Summit, N. J., has been suspended by a temporary injunction from the United States Circuit Court. The court, in a decision by Judges Lacombe, Ward and Noyes, holds that the commission should issue such an order only on complaint of a shipper tendering interstate traffic for transportation. The only complaint made was that by the Rahway Valley Railroad Co.

The reports of delayed passenger trains, compiled by the New York State Public Service Commission, Second District, for the month of May, shows in a total of 43,350 trains, a percentage of 87 on time at divisional terminals. The average delay for each late train was 23.3 minutes. The Long Island Railroad, for good cause, has been temporarily exempted, and several other roads have been exempted on account of the unimportance of trains involved. Many suburban and short-distance passenger trains have also been excepted. For the month of June, the number of trains was 50,122; percentage on time 86; average delay for each late train, 25.5 minutes. For the month of July, the total number of trains reported was 57,225; percentage on time 82; average delay for each late train 24.4 minutes.

The Birmingham Transportation and Traffic Association was organized in Birmingham, Ala., last week. The purpose of the organization is to promote the interchange of views on problems arising in railroad operation and to secure greater harmony of action in connection with the business of railroads centering in Birmingham. Active membership is open to officers of railroads entering Birmingham and of other railroads having active membership. Associate membership is open to officers of connecting lines and to traffic officers who are ineligible to active membership. The association will meet on the third Tuesday of each month, and at the November meeting officers are to be chosen. The chief promoter is H. E. Hutchens, General Superintendent of the Western district of the Southern Railway.

A Democratic Story.

"How many trips to Chicago has Chairman Hitchcock made?" repeated one of the officials at the Grand Central station. "You'll have to ask me something easier than that. I stopped counting after the 25th. We've got orders not to start any train for Chicago unless we're sure he's on it."

"I suppose you all know him by this time," suggested the reporter.

"Know him?" laughed the railroad man. "There isn't a man on the line that doesn't know him. All the porters and train hands call him Hank. Even the engines puff when they see him coming. We had to put a leather bottom in his parlor chair the other day. Sure, he has the same chair. He doesn't permit it to get cold. I tell you he knows every bit of bad track between here and Chicago, and he always rises before we lift a bump. He has a card index of all the bumps.

"One of the conductors tells a good story about him. On the last trip west, Hitchcock was sure he saw himself on a train speeding east. He had to look up his schedule before he would be convinced that he was not coming instead of going."—*New York World.*

Fares and Wages in England.

Two years ago last summer Mr. Bryan spent several months traveling abroad. Almost his entire political career as Congressman, as a candidate for the Presidency, and as an editor, has been one of criticism of corporations, and especially of our railroads. He has posed as the friend of the worker, the laboring man. For this reason, on his trip abroad he certainly must have made some study of railroad conditions; and it is strange that he did not find out and tell us something of the comparison between foreign railroad employees and the railroad employees of this country. Mr. Bryan could have told us that on his trip from Liverpool to London, a distance of 200 miles, his fare, including 150 pounds of baggage, was $5.50, while the fare from Boston to Albany, 201 miles, is $3.80. He could have found by inquiry that the engineers who pulled the train from Liverpool to London were paid $2.00, while the men who run the engines, Boston to Albany, receive $7.60 for substantially the same mileage, and the pay of conductors, firemen and trainmen are proportionately higher in the United States.

Mr. Bryan is probably more familiar with conditions in the West, and he will undoubtedly recall the fact that the fare, Chicago to Burlington, 206 miles, is $4.15, and inquiry would

have developed the fact that the engineers receive for this trip $8.40, or more than four times the pay of the English engineers for substantially the same mileage; the pay of conductors, firemen and trainmen being proportionately higher in this country.

If Bryan made the trip from London to Edinburgh, a distance of 400 miles, he paid $13.92 for his ticket. If he had felt interest enough in the matter to suggest the inquiry, he would have found that the engineers who handled the train received a total of $6.00 for the 400 miles run.

When he reached New York he could have traveled on the Empire State express from New York to Buffalo, a distance 40 miles greater than the distance London to Edinburgh, for $11.25; and he would have found by inquiry that the engineers who pulled the Empire from New York to Buffalo were paid $16.64.

In other words, while the fare in the United States was 24 per cent. less, the pay of American engine and train men was 177 per cent. more than that paid abroad.—*W. C. Brown to Chicago Railroad Employees.*

Central Association of Railroad Officers.

This association at its meeting at Peoria, Ill., on October 14, 15 and 16, elected the following officers:

President, J. C. Hagerty, Superintendent, B. & O. S. W., Cincinnati, Ohio.

First Vice-President, J. A. Somerville, Superintendent Terminals, Missouri Pacific, Kansas City, Mo.

Second Vice-President, W. J. Davis, Superintendent, Lake Erie & Western, Lafayette, Ind.

Secretary-Treasurer, O. G. Fetter, Manager, Cincinnati Car Demurrage Bureau, Cincinnati, Ohio.

The following committee was appointed to draft a new constitution:

J. H. Mulhern, Superintendent Chicago & Alton, Bloomington, Ill.

J. E. Taussig, Superintendent Terminals, Wabash, St. Louis, Mo.

J. M. Scott, Superintendent, Cincinnati, Hamilton & Dayton, Indianapolis, Ind.

S. M. Russell, Superintendent, Toledo, Peoria & Western, Peoria, Ill.

Fewer Passes in Texas.

J. H. Bond, Auditor of the Railroad Commission of Texas, has made up statistics regarding the free passes issued by the railroads in that state. He says that the total mileage traveled in Texas on free transportation in 1906 was 113,671,834 miles; in 1907, 123,774,562 miles and in 1908, 90,932,255 miles. The reduction in 1908 as compared with 1907 was 32,842,307 miles. The average earnings per passenger per mile in Texas during the last fiscal year were 2.225 cents, and he figures therefore that the anti-pass law has caused a total saving to the roads during the year of about $731,000 (instead of $65,000, as Mr. Mayfield, Chairman of the Commission, has been reported to have estimated). This estimate assumes, of course, that the people who formerly rode free now pay their fare, which may not be the fact. They may have concluded to stay at home. If they stayed at home there would be substantially no saving at all, unless their absence made it possible to run fewer cars on the trains. Mr. Bond gives the following statement of the kinds of people using passes:

	Miles.		
In exchange:	1906.	1907.	1908.
Officials, employees, other agents...	20,935,671	21,062,065	21,173,207
Employees and their families.....	68,948,437	81,307,345	67,497,370
On account of advertising.....	7,889,828	5,866,836	.....
State & health officials, Rangers, &c..	6,741,120	7,968,421	543,548
U. S. public officials and employees...	.....	.....	1,052,385
Other persons, charity, religious, etc...	9,156,778	7,569,895	665,745

Collateral of the Consolidated Steamship Company to be Sold.

All the shares of stock of various corporations held as collateral by the American Trust Co., of Boston, for a loan to the Consolidated Steamship Co. are to be sold on November 25 at public auction. The amount of stock of each company to be sold is as follows: Eastern Steamship Co., 28,563 shares out of a total outstanding of 30,000 shares; Metropolitan Steamship Co., 28,975 shares out of a total of 30,000; Mallory Steamship Co., 137,234 shares out of a total of 140,000; Clyde Steamship Co., 133,148 shares out of a total of 140,000; New York & Cuba Mail Steamship Co., 193,936 out of a total of 200,000; New York & Porto Rico Steamship Co., 78,800 shares out of a total of 80,000 shares.

The Proposed Electrification of the Illinois Central.

The directors of the Illinois Central at a meeting in Chicago on October 21, just preceding the annual meeting of stockholders, adopted the following resolution, which was sent to F. A. Busse, Mayor of Chicago:

"Resolved, That, in the opinion of this board, the demand on the part of the city and citizens of Chicago that the railroads entering the city should take such steps to reduce to the lowest possible limit the annoyance caused by noise and smoke is a reasonable demand, and this company should and will give immediate attention to the attainment of that end."

At the stockholders' meeting John C. Richberg, a holder of six shares of the company's stock, who lives near the Illinois Central's tracks in Chicago, introduced the following resolution:

"Resolved, That it is the sense of the stockholders of the Illinois Central railroad, in annual meeting assembled, that the board of directors should proceed with all reasonable despatch to electrify the service within the corporate limits of the city of Chicago."

The introduction of this resolution was unexpected to the management of the road, but after President J. T. Harahan called attention to the action that had been taken by the board of directors, the resolution of Mr. Richberg was unanimously adopted by viva voce vote. Mr. Harahan had previously made a short statement to the stockholders, outlining what had been done in regard to the proposed electrification. He stated that two trips had been made by L. C. Fritch, Assistant to the President, to New York, to study results on the roads that had electrified their New York terminals, and that a thorough investigation of the entire subject of electrification would be made.

Gross, Five Cents; Net 1.61.

When you board a street car and hand the conductor your fare, what becomes of the nickel? The official answer is found in the first annual report of the board of supervising engineers, the city's stewards. Here is where the nickel goes—when an honest conductor gets it. [Less 1.1 mills surplus retained in treasury, apparently]:

Paid in wages to employees.....	2.24 cents.
Paid for materials, supplies, etc.*.....	1.14 "
Paid for taxes	.01 "
Interest on value of property	.75 "
Profit paid to railways	.34 "
Profit paid to city	.41 "
Total	4.89 cents.

*Incident to the maintenance, operation and management of railways.

By another averaging process the board shows the average expense of hauling each passenger, including 5 per cent. interest on agreed valuation of properties, at 2.578 cents; average earnings per passenger carried, 3.036 cents, making the average profit per passenger carried 4.58 mills. The city's proportion of profit per passenger carried is 2.519 mills, while the company's proportion of profit per passenger carried is 2.061 mills.—*Chicago Inter-Ocean.*

From the New York Sun; Important.

McAlester, Okla.—Senator Beveridge, of Indiana, who spoke here, declared that the Rock Island road had purposely delayed his train throughout Oklahoma, breaking his itinerary up and otherwise seriously interfering with his speech-making as a retaliation for the support he gave the rate bill in the United States Senate.

Life on the Prairies.

A whole night in a Missouri Pacific railroad coach was the experience of passengers on the McPherson branch last night. A mile and a half on this side of Hesston the engine went dead. Water leaked into the firebox in such a stream that it was impossible to keep any kind of a blaze under the old kettle. The train is due to arrive at McPherson at 8.50 in the

evening, but it was something after 8 this morning when it arrived with its load of tired and disgusted passengers. When the engine was found to be hopelessly dead another engine was sent for from El Dorado. It arrived before morning, but at this juncture the 16-hour labor rule also caused delay. The crew had been working for 16 hours, and to bring the engine on without taking their rest they would have violated their rules.

The trainmen and passengers stretched out as best they could in the single coach and went to sleep.—*Topeka State Journal.*

Professor Hibbard at University of Missouri.

H. Wade Hibbard, Professor of Mechanical Engineering of Railroads at the Sibley College of Mechanical Engineering, Cornell University, is to become head of the department of mechanical engineering at the University of Missouri. He graduated from Brown in 1886 and in 1891 graduated from Cornell with the degree of Mechanical Engineer. For three years he worked in the mechanical department of the Pennsylvania, and later was appointed Chief Draftsman of the Lehigh Valley. Prof. Hibbard went to Cornell in 1898 as Assistant Professor and while there organized the department of railroad engineering.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries and date of next or regular meetings.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State street, Boston, Mass.; June, 1909.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th street, New York; second Friday in month.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York; November 18, 1908.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—E. H. Fritch, 962 Monadnock Building, Chicago; March 16-18, 1909.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, 390 Old Colony Building, Chicago; June, 1909.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th-street, New York; first and third Wednesdays in month, except July and August.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 West 39th street, New York; December 1 to 4, 1908.

AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 West 39th street, New York; October, 1908.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn street, Chicago, Ill.; last Wednesday in April, 1909.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. L. Young, C. & N.-W. Ry., Chicago, Ill.; May, 1909.

ASSOCIATION OF RAILWAY SUPERINTENDENTS OF BRIDGES AND BUILDINGS.—S. F. Patterson, B. & M. R.R., Concord, N. H.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wis. Central Ry., Chicago; June 23-25, 1909.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park place, New York; December 8, 9, 1908.

CANADIAN RAILWAY CLUB.—Jas. Powell, Grand Trunk Ry., Montreal, Que.; first Tuesday in month, except June, July and August.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, Montreal, Que.; January.

CENTRAL RAILWAY CLUB.—H. D. Vought, 62 Liberty street, New York; second Friday, in January, March, May, September and November.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R.R., Richmond, Va.; June 16, 1909.

INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 62 Liberty street, New York; May, 1909.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C., H. & D. Ry., Lima, Ohio

IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Iowa; second Friday in month, except July and August.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Building, Chicago, Ill.; June, 1909.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver street, Boston, Mass.; second Tuesday in month, except June, July, August and September

NEW YORK RAILROAD CLUB.—H. D. Vought, 62 Liberty street, New York; third Friday in month, except June, July and August.

NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minneapolis, Minn.; first Tuesday after second Monday in month, except June, July and August.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; fourth Friday in month, except June, July and August.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden street, Bethlehem, Pa.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; November 10-12, 1908.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; second Friday in month, except June, July and August.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, 218 Prudential Building, Atlanta, Ga.; third Thursday in January, April, August and November.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.

WESTERN RAILWAY CLUB.—J. W. Taylor, 390 Old Colony Building, Chicago: third Tuesday each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Building, Chicago; first Wednesday, except July and August.

Traffic News.

According to the *El Paso Herald*, dining cars are to be run through this winter between St. Louis and Mexico City.

During the last fiscal year 330 new industries of various kinds were established on the lines of the Missouri Pacific. They represent an invested capital of $17,359,000 and promise the road 136,780 carloads of freight annually.

The United States Supreme Court has fixed January 4 as the date for hearing the argument in the "commodities clause" cases against the anthracite coal carriers, and has directed the consolidation into one of the 12 cases, for the purpose of argument.

The Trunk Line railroads have notified shippers that where large quantities of old form bill-of-lading blanks are on hand, they can be used (until January 1) by stamping upon them a statement to the effect that the conditions of the new form are assented to. The old forms must not be used for "order" shipments.

The Salt Lake City Commercial Club has organized a traffic bureau. Charles A. Quigley has been elected president. Any banker, producer, merchant or manufacturer in Utah, Idaho, Nevada or Wyoming is eligible to membership. The bureau will negotiate with the traffic officers of the railroads to get more favorable rates for Salt Lake City.

The Arkansas Railroad Commission on November 4 will begin an investigation of the reasonableness of the passenger tariffs filed by the St. Louis, Iron Mountain & Southern, the St. Louis & San Francisco, the St. Louis Southwestern, the Kansas City Southern and the Chicago, Rock Island & Pacific, under which the maximum fare of these roads is raised from 2 to 3 cents a mile.

The Illinois Central has given notice that on November 12 it will establish milling-in-transit rates on grain moving from the principal grain carrying roads in Indiana, Illinois and the Northwest to New Orleans. The rates will apply on export shipments to Europe, Cuba and Central and South America. It is stated that this will enable the millers of New Orleans to handle their grain from 15 to 20 cents a barrel cheaper than heretofore.

The New York State Public Service Commission, Second district, has issued a circular to shippers and receivers of freight and express matter briefly explaining the law and the rules of the commission relating to the publication of tariffs, and giving information about the weekly circular issued by the commission, in which changes in tariffs are announced. Shippers are requested to promptly inform the commission when tariffs are not properly and promptly filed at stations.

The United States Circuit Court at St. Louis refused on October 23 to issue an injunction to restrain the Interstate Commerce Commission from enforcing its order reducing rates on cattle shipments from the Southwest to Chicago, St. Louis, Kansas City and other points. The order complained of was made by the Commission in the case of the Cattle Raisers' Association of Texas v. Missouri, Kansas & Texas et al., and the injunction was asked for by the Missouri, Kansas & Texas and 55 other roads. The court held that it had a right to go into the evidence to determine whether the new rate was confiscatory, but that before it did this there must be a showing that the Interstate Commerce Commission had exceeded its authority.

The Union Pacific, the Northern Pacific and the Great Northern filed amended bills of complaint in the United States Circuit Court at St. Paul on October 22, in the suits brought by these roads to have declared illegal the orders of the Interstate Commerce Commission in the Northwestern lumber rate cases. In their amended bills the roads, it is said, allege that important sections of the interstate commerce act are unconstitutional and also claim that the advances in rates made by them on November 1, 1907, were justified by the increase in the value of forest products and in the cost of

transporting them. The bill refers not only to the increase in value of northwestern lumber, but also of the white pine of Minnesota, Wisconsin and Michigan and of southern yellow pine.

The Interstate Commerce Commission has ruled that school tickets are unlawful, especially where confined to a certain kind of schools; but tickets may be limited to persons of certain ages, as, for instance, 12 to 21. A carrier offered a 46-trip monthly commutation ticket to be used only by pupils, without regard to age, in attendance on schools of a certain kind. The carrier may not inquire into the mission, errand or business of the passenger as a condition of fixing the transportation rate which such passengers shall pay.

Nine short lines in Arkansas have brought suit in the federal court to enjoin the Arkansas Railroad Commission from enforcing against them the state 2-cent fare law. An injunction restraining the Commission has been issued. The roads bringing the suit are the Arkansas Central, the Arkansas Southern, the Mississippi River, Hamburg & Western, the Arkansas & Louisiana, the Gurdon & Ft. Smith, the Brinkley, Helena & Indian Bay, the Arkansas Midland, the Lake Bluff & Western and the El Dorado & Bastrop. The state law permits lines 15 to 25 miles long to charge 3 cents per mile, but the Commission held that when a continuous trip was made over a short line and a connecting trunk line only 2 cents a mile could be charged. All the roads claim that the 2-cent rate, as applied to them, is confiscatory.

The Texas Supreme Court rendered a decision on October 21 that a cotton compress is not liable for demurrage when a cotton blockade exists in a railroad yard or at the compress. The case was that of the Missouri, Kansas & Texas Railway of Texas v. Capital Compress Co. During the cotton blockade in 1906 cotton consigned to buyers and concentrated at one of the compresses of the Capital Compress Company was delayed in reaching the compress platform. When it did reach the platform it was unloaded promptly. When the railroad settled with the compress company it deducted from the through rate large amounts for demurrage. In the decision it was held that there was no contractual relation between the compress company and the railroad, that the cotton was not consigned to the compress company but to others, and that the compress was not liable for demurrage, if any had accrued. The court said: "If free time began to run against said shipments of cotton from their respective arrivals in defendant's yards and the giving of notice of such arrival to plaintiff, the demurrage claimed by defendant is due it by some one. But if such free time only began to run from the placing of the cars containing said cotton on the siding adjacent to plaintiff's compress neither the plaintiff nor any one else owes said demurrage."

The Southern Pacific is to run agricultural and horticultural educational trains through California to carry university, government and other experts in farming, making stops at stations and holding institutes. The company, in its announcement, says that under the direction of its traffic department it has decided to operate free agricultural and horticultural instruction trains throughout the state with the co-operation of the University of California, Stanford University, the Department of Agriculture and the State Horticultural Commission. Trains managed in this way in Nebraska, Washington and other western states have, with the assistance of the universities and government people, been very successful in helping improve the quality of corn and wheat, in increasing the production per acre and in decreasing the amount of fallow land by crop rotation. The University of California through its extension work has accomplished a great deal and the government through its bureaus of soils and plant industry and the horticultural commission through its campaign in behalf of better quarantine laws and its fight against tree pests, have done a great deal for California in making cultivation more effective, and the railroad company desires to promote this work. Boards of trade, improvement clubs and similar local organizations are invited to give their recommendations as to the itineraries of the trains, through the local district freight and passenger agents of the Southern Pacific or to the university people.

Baggage Rules in Texas.

The railroads in Texas sought to place some restrictions upon the things that might be checked as baggage. The State Railroad Commission at once issued a circular defining baggage and fixing new rules for handling it, which hardly square with the desires of the railroads.

Baggage is defined as wearing apparel and such personal effects of passengers as may be necessary for their journey, and articles carried as samples by traveling salesmen. These articles must be checked on presentation of proper tickets when enclosed in receptacles which will insure safe transmission. Among articles that the Commission requires to be checked and included in the weight of passenger baggage are the following: Tool chests, miners' packs, steamer chairs, invalid chairs, guns (not loaded), saddles in bags, camp equipage, golf, cricket, baseball or other club paraphernalia in closed receptacles, cash registers, computing scales, school desks and opera chairs, adding machines, listing machines and samples of fencing, when in sample cases, but not in boxes; game (not exceeding amount allowed by law).

Baby carriages, go-carts and baby sleighs, containing only necessary articles, may be checked for not less than 25 cents, this charge to be separate from charges for excess baggage. Bicycles and tricycles must be checked as for 50 lbs. of excess baggage and not more than one such article will be checked for one passenger. Birds in cages and other harmless pets must be carried in baggage cars when accompanied by owner on same train for 25 cents apiece. Dogs, tied with rope or chain, or in crate with collar and tag showing name, when accompanied by owner on same train may be carried in the baggage car, a charge of 25 cents being assessed for each dog for any distance over 50 miles, the charge not to exceed $1 for the trip to destination or junction of branch or connecting line. Not more than two dogs will be carried for any one person.

Storage will be charged for each piece of inbound or outbound baggage remaining at stations over 24 hours as follows: First 24 hours, free; second 24 hours or fraction thereof, 25 cents; each succeeding 24 hours or fraction thereof, 10 cents. Sundays and legal holidays will be considered as additional free time. Baggage of theatrical or other parties traveling at party rates will not be subject to these rules except as to storage.

Uniform Bill of Lading.

At a conference of traffic officers of western roads in Chicago on October 23 it was decided to modify Rule 4 in the Western Classification, which provides that all shipments shall be handled at the carrier's common law liability. The new rule will provide that an extra charge of 10 per cent. will be made if shippers do not accept the liability contract of the uniform bill of lading recommended by the Interstate Commerce Commission. This decision of the western roads makes complete their adoption of the uniform bill of lading, but it is probable that they will not be able to use it until after December 1. The western roads also decided to permit shippers temporarily to use the old bill-of-lading blanks which they have in stock, with the requirement, however, that there shall be stamped on the bill the statement that the shipment is received subject to the provisions of the uniform bill-of-lading.

The eastern roads have sent out notice to shippers at Chicago that it has been decided that the carriers in Official Classification territory will, until December 31, 1908, inclusive, receive property under the old forms, as noted elsewhere.

Traffic Club of Chicago.

The Traffic Club of Chicago will give a dinner to its members in the main dining room of the Grand Pacific Hotel, Chicago, on the evening of election day, November 3, at 6:30 p.m. Entertainment will be provided and the election returns will be received as late as any of the members desire to stay. There will be no expense to the members of the club. Guests may be invited, but a charge will be made for them at the rate of $1.50 per ticket.

REVENUES AND EXPENSES OF RAILROADS.

MONTH OF AUGUST, 1908.

See also issues of October 16 and 23.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
		Freight.	Passenger.	Total, inc. misc.	Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama Great Southern	309	$178,550	$101,759	$304,303	$31,876	$60,493	$6,487	$111,050	$8,744	$218,650	$85,653	$324†	$11,429	$73,900	$33,387
Ann Arbor	301	104,253	59,666	176,850	19,806	24,095	3,501	63,439	3,750	114,591	62,259	.....	11,369	50,890	‡21,403
Central New England	293	125,697	34,698	170,897	40,695	22,563	1,358	53,824	2,552	120,992	49,905	.....	5,600	44,305	64,151
Central of Georgia	1,913	473,224	273,837	812,293	125,899	180,501	26,220	288,036	37,090	657,746	154,547	5,384	38,663	121,268	‡72,624
Chicago, Peoria & St. Louis	255	93,707	38,231	138,066	19,368	34,703	6,173	49,849	3,964	114,057	24,009	.....	4,600	19,409	‡10,877
Chicago, Rock Island & Gulf	493	164,489	63,178	240,963	52,214	18,520	5,394	87,658	7,254	171,040	69,923	146†	6,021	63,756	9,563
Cin., New Orleans & Texas Pacific	337	500,583	132,064	666,687	79,896	156,280	15,497	180,732	17,006	449,411	217,276	1,678†	19,000	196,598	16,319
Colorado Midland	338	137,097	46,240	202,023	28,860	22,599	9,548	80,763	5,774	147,544	54,479	474	8,400	46,553	1,437
Detroit & Mackinaw	348	61,151	30,454	97,239	9,891	14,203	1,852	33,340	2,608	61,894	35,345	249	6,508	29,086	‡317
Detroit, Toledo & Ironton	489	134,319	15,463	157,340	22,498	30,154	2,398	55,781	3,720	114,551	42,789	190†	6,979	35,620	23,827
Duluth, Missabe & Northern	273	1,471,327	28,174	1,504,568	90,200	87,260	943	152,462	8,711	339,576	1,164,992	12,119	60,224	1,116,887	‡32,107
Evansville & Terre Haute	310	122,730	57,435	196,956	26,464	20,466	2,648	55,744	5,885	111,207	85,749	60†	9,035	76,654	12,833
Fort Worth & Denver City	454	233,993	180,056	433,139	74,317	55,560	7,242	116,573	12,569	266,261	166,878	1,365	8,800	159,443	50,204
Georgia Southern & Florida	395	72,779	55,936	146,622	8,182	20,496	5,067	53,389	8,006	95,141	51,481	1,630	7,551	45,560	27,961
Gulf & Ship Island	307	91,820	31,700	131,657	31,291	24,229	1,452	50,232	6,853	114,057	17,600	.....	3,685	13,915	‡34,976
Hocking Valley	347	511,333	87,018	615,314	60,229	129,239	7,141	163,844	10,101	370,554	244,760	8,265	20,653	232,372	‡16,457
Kansas City Southern	827	537,567	121,660	735,652	85,135	90,351	21,305	221,211	24,851	442,853	292,799	.....	28,330	264,469	‡68,689
Long Island	391	214,892	642,663	900,855	100,492	102,207	14,983	321,051	16,758	555,491	345,364	93,451	21,714	417,101	19,707
Louisiana Ry. & Nav. Co.	344	66,335	10,479	81,676	23,241	10,910	2,951	34,062	5,995	77,160	4,516	.....	3,000	1,516	11,492
Mason City & Fort Dodge	386	125,680	43,956	180,139	19,451	23,385	1,704	64,622	648	109,810	70,329	.....	6,000	64,329	15,052
Mobile, Jackson & Kansas City	402	71,144	25,740	104,554	18,299	14,693	1,651	36,968	8,274	79,885	24,669	.....	2,831	21,838	4,672
Morgan's La. & Tex. R. R. & S.S. Co.	351	207,632	77,204	308,486	47,947	46,111	8,321	128,638	11,744	242,761	65,725	330	14,900	51,155	27,766
Nevada & California	331	47,749	23,195	79,686	13,396	11,736	934	29,556	1,719	57,341	22,345	161	7,016	15,490	‡37,606
Northern Central	473	705,016	193,749	948,385	76,787	158,951	11,825	405,111	18,076	670,750	277,635	247	19,514	258,368	‡79,035
Northwestern Pacific	368	136,496	184,044	341,013	69,769	38,046	2,021	97,209	9,144	216,189	124,824	.....	9,230	115,594	‡7,332
St. Joseph & Grand Island	319	96,733	39,670	148,545	18,428	15,763	5,384	42,484	3,324	85,383	63,162	464	6,772	56,854	‡19,235
St. Louis, Brownsville & Mexico	451	60,185	26,060	92,916	17,473	12,059	3,292	32,113	4,902	69,839	23,077	118	3,000	20,105	3,020
Santa Fe, Prescott & Phoenix	257	71,906	26,899	104,988	19,904	8,258	1,550	23,863	4,287	57,862	47,126	.....	.....	47,126	3,853
Texas & New Orleans	450	199,140	66,327	281,589	34,786	30,824	4,674	121,156	8,305	199,745	81,844	182	7,405	74,621	‡19,467
Texas Central	268	33,255	44,185	83,213	9,743	13,337	1,071	29,186	2,602	55,939	27,274	.....	1,969	25,305	‡3,703
Toledo & Ohio Central	441	352,243	69,571	438,223	57,622	70,304	5,084	128,397	6,287	267,694	170,520	2,101	13,582	159,048	4,392
Toledo, St. Louis & Western	451	234,504	65,429	321,448	38,242	44,906	9,664	96,420	9,224	198,456	122,992	13,341†	11,500	98,151	‡15,908
West Jersey & Seashore	371	130,958	568,025	717,889	69,930	53,147	10,620	198,805	7,455	339,957	377,932	21,388	17,112	382,208	‡86,084
Wheeling & Lake Erie	442	443,961	56,368	532,070	86,152	112,802	4,273	164,285	14,044	381,556	150,514	611	22,320	128,805	‡47,390
MONTHS OF JULY AND AUGUST, 1908.															
Alabama Great Southern	309	$344,655	$202,146	$597,926	$64,781	$125,745	$14,594	$208,429	$18,120	$431,669	$166,257	$1,166†	$22,859	$142,232	$32,893
Ann Arbor	301	191,718	102,905	318,257	41,176	47,439	6,409	120,591	8,073	223,688	94,569	.....	22,738	71,831	‡33,890
Central New England	293	236,312	66,071	324,373	75,613	41,662	2,707	113,754	5,079	238,815	85,558	.....	11,200	74,358	75,707
Central of Georgia	1,913	1,046,877	558,570	1,743,554	247,878	351,286	52,005	583,415	78,834	1,308,418	435,136	11,349	77,331	369,154	‡39,657
Chicago, Peoria & St. Louis	255	177,134	67,524	256,672	38,061	66,187	12,091	97,994	8,491	222,824	33,848	.....	9,200	24,648	‡454
Chicago, Rock Island & Gulf	493	298,088	120,623	443,884	119,188	35,983	13,727	178,054	16,955	363,907	79,977	442†	9,507	70,028	‡12,355
Cin., New Orleans & Texas Pacific	337	978,847	249,452	1,299,869	127,151	288,417	32,323	393,063	33,388	874,342	425,527	4,185†	38,000	383,342	63,290
Colorado Midland	338	265,137	89,155	395,371	55,923	46,451	19,427	148,417	11,315	281,533	113,838	583	16,800	97,621	‡10,130
Detroit & Mackinaw	348	131,366	59,241	201,842	17,314	29,370	4,168	66,392	5,842	123,086	78,756	2,004†	13,352	63,400	15,287
Detroit, Toledo & Ironton	489	223,703	28,457	267,846	40,397	60,835	4,707	104,126	11,101	221,166	46,680	190†	13,958	32,532	27,835
Duluth, Missabe & Northern	273	2,915,528	57,107	2,983,237	163,594	179,811	1,701	305,309	22,553	678,968	2,310,269	21,978	120,480	2,211,767	497,559
Evansville & Terre Haute	310	239,901	108,596	382,665	52,245	46,024	4,973	107,216	12,055	222,513	160,153	31†	18,070	142,051	28,612
Fort Worth & Denver City	454	458,852	329,830	825,920	135,620	97,922	18,576	234,124	25,606	511,848	314,072	1,958	17,133	298,897	70,237
Georgia Southern & Florida	395	144,264	108,895	286,584	17,339	48,769	10,342	110,753	16,711	203,914	82,670	3,145	15,103	70,712	23,976
Gulf & Ship Island	307	184,158	62,338	262,770	63,560	49,690	2,906	100,324	14,120	230,600	32,170	.....	7,370	24,800	‡89,611
Hocking Valley	347	951,957	161,074	1,145,835	122,641	222,075	14,897	309,683	22,242	691,538	454,297	22,066	40,458	435,905	‡29,895
Kansas City Southern	827	1,089,103	236,343	1,473,085	175,258	171,384	43,168	452,664	49,804	892,278	580,807	.....	56,659	524,148	‡104,804
Long Island	391	416,431	1,346,437	1,852,450	200,070	203,708	35,386	644,907	35,444	1,119,515	732,935	207,394	43,427	896,902	91,907
Louisiana Ry. & Nav. Co.	344	116,210	18,313	152,074	50,966	22,468	5,733	72,061	10,131	161,359	9,285*	.....	6,000	15,285†	‡10,587
Mason City & Fort Dodge	386	221,284	86,353	327,719	38,724	41,809	3,353	120,594	1,309	205,789	121,930	.....	12,000	109,930	83
Mobile, Jackson & Kansas City	402	141,466	51,157	209,087	39,057	28,225	2,923	72,758	16,648	159,610	49,477	.....	5,662	43,815	7,008
Morgan's La. & Tex. R. R. & S.S. Co.	351	407,623	160,218	608,027	88,424	92,332	17,591	251,324	23,644	473,315	134,712	519†	29,800	104,393	128,396
Nevada & California	331	92,406	44,973	154,569	26,285	22,759	1,579	56,347	3,847	110,817	43,752	141	14,035	29,858	‡112,289
Northern Central	473	1,332,918	369,794	1,810,396	90,710	319,131	25,543	799,509	36,243	1,271,136	539,260	1,475	39,029	501,706	‡74,498
Northwestern Pacific	368	237,696	400,213	677,900	127,108	75,017	4,256	193,698	18,674	418,753	259,147	.....	18,460	240,687	‡31,639
St. Joseph & Grand Island	319	177,963	73,545	273,329	36,756	29,279	10,628	83,581	7,236	167,480	105,849	475	13,544	92,780	‡40,753
St. Louis, Brownsville & Mexico	451	105,125	51,821	169,800	29,251	23,917	5,499	61,829	9,097	129,593	40,207	9†	6,000	34,198	‡3,408
Santa Fe, Prescott & Phoenix	257	140,470	55,260	209,163	38,828	17,123	3,467	49,677	8,757	117,852	91,311	.....	.....	91,311	‡26,032
Texas & New Orleans	450	409,385	134,682	577,390	80,495	71,388	9,538	236,243	16,508	414,172	163,218	77	22,351	140,944	5,978
Texas Central	268	64,558	83,860	159,908	20,789	25,680	2,013	62,251	6,145	116,878	43,030	.....	3,959	39,071	‡10,765
Toledo & Ohio Central	441	722,742	125,430	876,776	116,294	128,939	10,821	248,484	10,913	515,451	361,326	9,046	27,168	343,204	27,770
Toledo, St. Louis & Western	451	466,350	107,535	615,263	68,272	92,606	19,249	189,367	17,774	387,268	227,995	29,596†	23,000	175,399	‡17,423
West Jersey & Seashore	371	271,954	1,037,878	1,346,832	148,805	107,663	26,630	399,938	14,342	697,378	649,454	39,314	34,225	654,543	‡118,923
Wheeling & Lake Erie	442	894,980	106,198	1,059,282	150,590	208,812	9,989	317,243	26,961	713,595	345,687	1,380	44,593	302,474	‡37,228

* Deficit. † Loss. ‡ Decrease.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Canton-Hankow has ordered six locomotives from the American Locomotive Co.

The Virginian is asking bids on 15 heavy Mallet compound freight locomotives and three switching locomotives.

The Central Northern Railway of Argentina has ordered eight locomotives from the American Locomotive Co.

The Grand Trunk Pacific has ordered 25 locomotives from a Canadian builder for delivery during the coming year.

The Panama Railroad received bids until October 28 for 12 5-ft. gage oil burning Mogul freight locomotives. (Circular P-178.)

General Dimensions.

Weight on drivers	127,500 lbs.
Total weight	147,500 "
Cylinders	20 in. x 26 in.
Diameter of drivers	63 "
Boiler, type	Extended wagon top
Boiler, working steam pressure	200 lbs.
Heating surface, tubes	2,030 sq. ft.
" " firebox	181 "
" " Total	2,211 "
Tubes, number	316
" outside diameter	2 in.
" length	12 ft. 3 3/16 "
Firebox, length	108 3/16 "
Firebox, width	41 1/4 "
Water capacity	5,000 gals.
Oil capacity	2,300 gals.

Special Equipment.

Axles	Open-hearth steel
Boiler, lagging	Magnesia.
Brakes	Westinghouse
Couplers	Tower
Driving box	Cast iron
Injectors	Hancock
Lubricator	Nathan
Piston and valve rod packing	U. S. Metallic
Safety valve	3-in. consolidated
Sanding devices	Leach pneumatic
Tires	Open-hearth steel
Valve gear	Shifting link
Valves	Richardson balanced

CAR BUILDING.

The Western Maryland is asking prices on 500 hopper bottom cars.

The Louisville & Nashville will build 500 coal cars in its own shops.

The Georgia & Florida is asking prices on a number of flat and box cars.

The San Antonio & Aransas Pass is asking prices on 500 box and 200 stock cars.

The Nebraska Traction & Power Co., R. H. Oliver, Chief Engineer, Omaha, Neb., is in the market for electric cars.

The National Car Line Co., Chicago, ordered, in August and September, twenty 8,000-gallon tank cars from the Bettendorf Axle Co.

The Clarkesville Railway Co., which is building a new city line at Clarkesville, Ga., will equip its road with gasolene motor cars.

The Missouri Pacific has given a contract to the American Car & Foundry Co. for repairing about 6,000 freight and 75 passenger cars.

The Montreal Engineering Company has ordered a number of box and flat cars from the Wonham-Magor Engineering Works, New York.

The Virginian is asking bids on 1,500 fifty-ton coal cars. The designs for these cars were published in the *Railroad Age Gazette* of June 12, p. 60.

The Colorado & Southern has ordered four dining cars from the Pullman Co. Three of these cars are for the Ft. Worth & Denver City and one for the Colorado & Southern.

The Carolina, Clinchfield & Ohio has not yet ordered the 1,000 fifty-ton steel coal cars, prices on which have been asked, as reported in the *Railroad Age Gazette* of September 4.

The Harriman Lines' dining cars and combination cars, which are a part of the 220 passenger cars recently ordered from the Pullman Co., are not to have steel underframes, as has been reported. The 30 dining cars and 12 combination cars are to be of all-wood construction and the remaining 178 are to be of all-steel construction.

The Illinois Central has ordered 400 Hart convertible cars from the Rodger Ballast Car Co. These will be built at the Detroit works of the American Car & Foundry Co., according to Harriman Lines specifications. The 681 steel gondola cars ordered from the Cambria Steel Co., as reported in the *Railroad Age Gazette* of Oct. 16, will be built to the same standard specifications, except that they will be equipped with heavy Miner draft gear. No passenger cars have as yet been ordered.

The Central of Georgia has ordered 24 passenger cars from the Pullman Company. This order includes 15 day coaches, five express, three combination mail and express, and one passenger and baggage car. These cars will be 60 ft. long, inside measurements. The bodies and underframes will be of wood. The special equipment includes:

Bolsters, body and truck	Double Body Bolster Co.
Brakes	Westinghouse
Brake-beams	Diamond special
Brake-shoes	American Brake-Shoe Foundry Co.
Brasses	Ajax
Couplers	Janney
Curtain fixtures	Forsythe
Curtain material	Pantasote
Draft gear	Sessions friction
Heating system	Gold
Journal boxes	Symington
Lighting system	Pintsch
Paint	Tuscan red
Platforms	Standard Steel Coupler Co.
Side bearings	Miner
Springs	Railway Steel-Spring Co.
Vestibules	Pullman
Wheels	Standard Steel Co.

IRON AND STEEL.

The Chicago City Railway is preparing specifications for special track work. The order will probably be given to the Lorain Steel Co., which has already furnished a large supply of similar material.

The Chicago & North-Western has given a contract to the United States Steel Corporation for furnishing about 20,000 tons of structural steel for use in connection with the new terminal at Chicago.

The Isthmian Canal Commission will receive bids until Nov. 9 for rails, rail clamps and keys, bridle bars, fish plates, cable and repair parts for dump cars, locomotives, dredges, steam shovels. (Circular No. 474.)

The Iowa Central has ordered 4,000 tons of structural steel for a bridge across the Mississippi river at Keithsburg, Ill., the contract going to the McClintic-Marshall Construction Co. (See Keithsburg item under Railroad Structures.)

The Bureau of Manufactures, Washington, D. C., will supply, on application, specifications and drawings (No. 2733) in connection with an inquiry for 20,000 tons of rails, bids for which will be received until April 15, 1909, by a state railroad in the Far East.

RAILROAD STRUCTURES.

Amarillo, Tex.—The Atchison, Topeka & Santa Fe will rebuild its shops, which were recently destroyed by fire. (Oct. 23, p. 1218.)

Baltimore, Md.—The Pennsylvania Railroad, it is said, has submitted plans to the city authorities for building a large passenger station.

Beaumont, Tex.—See Jacksonville, Tex.

Brandon, Man.—The City Council has accepted the bid of the Dominion Bridge Co., of Montreal, who offered to build a steel bridge at First street for $27,288. The concrete foundation and pillars are almost finished. The Canadian Pacific is starting work on the section of the bridge over its tracks.

Brownsville, Texas.—It is believed that at a recent conference between Hon. Rafael Pagana, representing the Mexican government and the National Lines of Mexico, and D. M. Phillips, a consulting engineer, the site for the proposed inter-

national bridge over the Rio Grande river was located. The bridge is to be used jointly by the National of Mexico and the St. Louis, Brownsville & Mexico. (Aug. 21, page 781.)

Chicago, Ill.—The Chicago & North-Western has awarded the contract for its new passenger station to the George A. Fuller Co., Chicago and New York. The contract requires the building to be completed by January 1, 1910. About 100 subcontracts will be let by the Fuller company in the next few weeks, including concrete work, stone work and steel fabrication. (Oct. 23, p. 1218.)

The Chicago, New York & Boston Refrigerator Co. has awarded the general contract for a warehouse and office building to be built at Fifty-first street and St. Louis avenue to Chaney & Archibald, 145 Van Buren street, Chicago. It will be a one and two-story structure, 220 ft. x 54 ft., of brick construction and thoroughly fireproof.

Dallas, Tex.—According to press reports, the State Railroad Commission will accept only as a temporary improvement the plans submitted by the Missouri, Kansas & Texas for additions to the passenger station increasing its facilities about 50 per cent. The railroad company may make the additions pending arrangements for a large permanent station, or of a union passenger station, which has been talked of for some time.

Des Moines, Iowa.—The steam railroads entering this city offer to build a viaduct over the railroad tracks in West Des Moines as soon as the city has procured the proper releases from abutting property holders. Construction work is to be commenced promptly and pushed to completion.

Hulbert, Ark.—The Chicago, Rock Island & Pacific has let a contract for new terminal yards, roundhouse and coal chutes to the Dalhoff Construction Co., Little Rock, Ark. The contract calls for an expenditure of about $200,000.

Iowa Falls, Iowa.—The St. Paul & Des Moines has given a contract to the Des Moines Bridge & Iron Co. for the construction of a steel bridge across the Iowa river at Iowa Falls. The structure will be 500 ft. long, requiring five spans, each 100 ft. in length. The abutments and piers will be of concrete construction.

Jacksonville, Tex.—According to reports from this place, the residents are offering inducements to the Texas & New Orleans to locate its roundhouse and repair shop here, instead of rebuilding the structures recently burned at Beaumont, with a loss of about $50,000. Other reports say work will be started at once rebuilding at Beaumont.

Keithsburg, Ill.—The Iowa Central has given a contract for 4,000 tons of steel for a new bridge across the Mississippi river to the McClintic-Marshall Construction Co. The contract includes steel for 18 spans of deck plate girders, each 67 ft. long; two additional spans of plate girders, each 203 ft. long, and 10 spans of riveted through trusses, each 205 ft. long. Waddell & Harrington, Kansas City, Mo., are the Consulting Engineers. (Oct. 2, p. 1068.)

Memphis, Tenn.—The revised ordinance for building a $2,000,000 union station to be used by all the railroads entering Memphis has passed the lower board of the City Council. The station is to be built in South Memphis, preliminary work for which has been commenced.

Mitchell, S. Dak.—The Chicago, Milwaukee & St. Paul has prepared plans for a new passenger station, 220 ft. x 26 ft., to be built at the south end of Main street. It will be one and two stories high, of brick construction and will cost about $35,000.

Neenah, Wis.—The Chicago & North-Western has prepared plans for the construction of a new freight house.

Portland, Ore.—Plans for a new Southern Pacific passenger station at East Morrison and East First streets, Portland, have been approved and work will be begun at once. The structure will be built of concrete blocks and will have dimensions of 30 ft. x 120 ft. It will cost $20,000.

The City Council recently refused to adopt a resolution to delay preparations for the construction of the Madison street bridge to replace the old viaduct. It is believed that work will be started soon. The cars of Portland Railway, Light & Power Co. will use the bridge.

Richmond, Va.—In reports made by the receivers of the Norfolk & Southern to the Federal Court recommendations, it is said, are made for the building of offices, to cost about $50,000, on the property recently acquired in Water street. An additional freight house, to cost about $30,000, is also recommended on the same property. See Norfolk & Southern under Railroad Construction.

St. Jacques, N. B.—Bids will be received until November 2 by John Morrissy, Secretary of the Department of Public Works at Fredericton, N. B., for building a steel and concrete bridge over Silver Stream. The plans and specifications may be seen at the offices of the above department, those of Charles Cyr, St. Leonard's, N. B., or Jesse W. Baker, Madawasko, N. B.

Winnipeg, Man.—A contract for building the locomotive and car shops of the Grand Trunk Pacific has been given to Tom Kelly & Sons at $500,000.

SIGNALING.

The General Railway Signal Co., Buffalo, N. Y., has recently contracted for interlockings as follows: Boston & Albany, a 64-lever mechanical plant at Beacon Park, Boston, Mass.; Chicago & North-Western, an 80-lever electric plant at St. Francis, Wis., and a 48-lever electric plant at Chase Yard, Wis.; Northwestern Elevated, a 28-lever electric plant at North Water Street Terminal, Chicago; Erie Railroad, a 44-lever plant (material only) at Campbell Hall, N. Y.

SUPPLY TRADE NOTES.

The American Water Softener Co., Philadelphia, is installing a 500,000 gallon filter plant for the Kanawha & Michigan at Hobson, Ohio.

The W. K. Kenly Co., Chicago, has increased its capital stock from $25,000 to $50,000 and the number of directors from five to seven.

The Chicago & North-Western has ordered two steam shovels and two steam wrecking cars from the Bucyrus Company, South Milwaukee, Wis.

McCord & Co., Chicago, have moved their plant for the manufacture of automobile supplies to Detroit, Mich., where increased facilities have been obtained.

Howard Swearer has been appointed Manager of Sales in the Railway Department of James B. Sipe & Co., Pittsburgh, Pa., succeeding Benson E. Brown, resigned.

G. K. McMullen, for over ten years Sales Manager of the Fox Machine Co., Grand Rapids, Mich., has resigned, effective November 15, and will at that time engage in business for himself, announcement of which will be made later.

The American Car & Foundry Co., New York, has given the contract for the steel for the erection of its new buildings at the St. Louis plant to the McClintic-Marshall Construction Co. The work involves about 800 tons of structural steel.

The American Diamond Blast Co., New York, not the American Water Proofing Co., as recently stated in these columns, has acquired the Anti-Hydro Water Proofing business. The latter is simply a contracting company controlled by the former.

H. B. Huskey has been appointed Sales Manager of the Cleveland district of the Allis-Chalmers Co., Milwaukee, Wis., succeeding George A. Williams. Mr. Huskey has for several years had charge of the crushing and cement machinery in that district.

The Eastern Granite Roofing Co., New York, has supplied 150,000 sq. ft. of its reinforced granite roofing for the passenger umbrella sheds and baggage rooms, etc., of the recently completed passenger station of the Southern Railway at Chattanooga, Tenn.

The Charles Parker Co., Meriden, Conn., says that business generally is improving in the line of hardware, especially in vises, indicating a revival of business in other lines, since it shows either that shops are refitting with new tools, or that new shops are being built.

The Lumley Purchasing & Supply Co., New York, has been incorporated with a capital stock of $10,000 to deal in railroad equipment. The incorporators are: Thomas J. McPherson, 1174 Jackson avenue; Charles Cole, 123 West Eighty-third street, New York; Arthur M. Brothers, Mineola, N. Y.

The Hewitt Manufacturing Co., Chicago, has purchased the business and stock of the Twentieth Century Brass Works, of Houston, Tex., and will erect additional buildings, including a brass foundry. The incorporators in Texas are W. F. Short and John C. Harris, of Houston, and W. H. Croft, of Chicago.

J. D. Edmonds, who has been for a number of years in the Sales and Operating Departments of the Western Electric Co., Chicago, has resigned to become Superintendent of Works of the Sterling Electric Co., Lafayette, Ind. Mr. Edmonds' name was erroneously printed as J. D. Edwards in our issue of October 16.

The Youngstown Car & Manufacturing Co., Youngstown, Ohio, has received an order for 12 steel ash dump cars and three steel hopper bottom cars of 30 tons capacity from the Water Works Department of Philadelphia, Pa. An order has also been received from the Sandusky Portland Cement Co., Syracuse, Ind., for 10 steel gondola cars.

Alonzo G. Delany, for the past two years connected with the Safety Car Heating & Lighting Co., New York, and previous to that, for ten years, in the mechanical department of the Chicago, Burlington & Quincy, has been appointed a representative of the Chicago Car Heating Co., at the main office in Chicago.

The Indiana Foundry Company, Ltd., Indiana, Pa., is preparing plans to enlarge its foundry capacity to take care of its sand drying stove trade more promptly. It will build an addition to the present foundry moulding room. Within the past few days a number of these stoves have been shipped to the Pacific coast and Canada, and arrangements have been made in New York for export trade. Orders are booked for a long time ahead.

The Baltimore Bridge Co., Baltimore, Md., has the contract for structural steel in the towers of the cableways to be erected by the Lidgerwood Manufacturing Co., New York, for the Isthmian Canal Commission for the construction of the Gatun lock. There will be nearly 800 tons of steel in these towers, there being 14 of them in all. Twelve of them are of unusually heavy construction, supporting duplex cables. The other two will support a single cable.

W. R. Brixey has incorporated his business as manufacturer of kerite insulated wires and cables under the name Kerite Insulated Wire & Cable Co., 30 Church street, New York, with the following officers: R. D. Brixey, President and Treasurer; R. W. Brixey, Vice-President; A. D. Brixey, Secretary. There is no change in ownership or management and the business will be conducted as heretofore. The western representative is the Watson Insulated Wire Co., Railway Exchange, Chicago.

The Balfour Spike & Manufacturing Co. has been incorporated in Washington with a capital stock of $100,000. The articles of incorporation state that the principal purposes of the company are to purchase the patent on a safety railroad spike and to carry on a business of manufacturing and selling spikes and subsequently to secure rights in foreign countries. The incorporators are: John W. Balfour, Robert H. Buddy, Charles Rickabaugh, M. W. Dibble and Frank Armstrong.

The Isthmian Canal Commission, Washington, D. C., asks bids up to October 30 on two electric air compressor units for driving Sullivan channelers. Circular No. 475-A. The date for opening bids on four berm and four chamber cranes, Circular No. 467, has been postponed to November 5. Bids are asked until November 16 on three rapid unloading cranes, with four self-digging automatic grab buckets. Circular No. 475. Bids asked until November 9 on other supplies as mentioned under Iron and Steel.

Theodore Thomas & Co., Chicago, are the agents in the steam railroad field and the field of the steel interests for the Cummins postage stamp perforators, manufactured by the B. F. Cummins Co., Chicago and New York. At the meeting of the Association of Transportation and Car Accounting Officers held at Niagara Falls, Ont., last June, the recommendation was made that railroads avail themselves of the privilege of perforating postage stamps to stop the misuse or stealing of them. (See *Railroad Age Gazette*, July 3, p. 428.)

Farlow attachments, made by the Farlow Draft Gear Co., Baltimore, Md., for friction draft gear are now being applied at the plant of the South Baltimore Steel Car & Foundry Co. to 500 Atlantic Coast Line box cars. The Farlow twin spring draft gear is being applied to 75 cars being built by the Maryland Steel Co. for use in its iron ore business in Cuba. The Farlow company is also receiving numerous orders for twin spring draft gear in small lots to be used in rebuilding old equipment. The Cumberland & Pennsylvania is rebuilding 200 cars, on which they are using the Farlow draft gear with malleable iron draft sills.

The Hilles & Jones Co., Wilmington, Del., has received from the Pullman Company an order for a number of machine tools for use on steel cars for the new plant being built at Pullman, Ill. The order includes a 12-in. gate shear to shear ¾-in. plates 12 ft. long at one stroke, a heavy and substantial machine driven by a 40 h.p. motor direct connected; a number of single vertical shearing machines, one of which is provided with a turret head so the knives can be moved around and set at any position for the trimming of end sills and work of similar nature; and a number of vertical and horizontal punching machines, coping machines and a 75-ft. spacing table.

The American Compressor & Pump Co., New York, has been organized to make air and gas compressors, air receivers, high duty vacuum pumps, pneumatic specialties, etc. The works are at 718 East Pratt street, Baltimore, Md., in charge of Alex. Slaysman, Jr., of the firm of Slaysman & Co., New York, engineers, machinists and manufacturers of automatic can making machinery, etc. The sales department is in charge of Frederick B. Vail, heretofore General Sales Agent of the American Air Compressor Works, and previously Manager of the Clayton Air Compressor Works. The new company can make all repairs for either of these makes, and each new machine is made to templets and jigs and therefore all parts are interchangeable.

James McNaughton, who has been elected Vice-President of the American Locomotive Co., with office at New York, in charge of domestic and foreign sales, succeeding R. J. Gross, who resigned to give his time to other interests, has hitherto been Manager of the Schenectady works. Mr. McNaughton was born in 1859 at Queensville, Ont. In 1873 he began to serve his apprenticeship as a machinist, and his first railroad work was in 1880 as machinist on the Chicago & West Michigan, now part of the Pere Marquette. He served for two years on the Minneapolis & St. Louis and then went to the Northern Pacific. Beginning on this road in 1882, he was successively machinist, gang boss, machine foreman and general foreman. In 1888 he was made Master Mechanic of the Montana division. In 1890 he was appointed Superintendent of Motive Power of the Wisconsin Central, and four years later was given charge also of the car department of that road. In 1898 he left railroad service to become General Superintendent of the Brooks Locomotive Works at Dunkirk, N. Y. When the American Locomotive Co. was formed, he was put in charge of the Schenectady works, where he remained until his recent promotion.

James McNaughton.

TRADE PUBLICATIONS.

Manganese Steel Castings.—The American Brake Shoe & Foundry Co., Mahwah, N. J., has issued a folder containing a list of the manganese steel castings which it manufactures.

Hayes Derail.—The Hayes Track Appliance Co., Geneva, N. Y., has just issued leaflet No. 52, which contains an article describing the development of the Hayes derail. A number of half-tone illustrations show some of the installations on the Pennsylvania Railroad.

Railroad Motor Cars.—The Buda Foundry & Manufacturing Co., Chicago, has issued an attractive catalogue, 9¼ in. x 12½ in., illustrating and describing the motor velocipedes, inspection cars, section gang cars, bridge gang cars and power cars which it manufactures. The different types of motor cars are illustrated by full-page half-tones and the descriptive matter includes details.

Western Railway and Logging Railroad Directory.—The second edition of this directory, including the states of Oregon, Washington, California, Nevada, Colorado, Idaho, Utah, Montana, Arizona, New Mexico, Sandwich and Philippine Islands and British Columbia, has been issued by *The Timberman*, of Portland, Ore. The statistical data of the railroads compiled in this directory is complete and accurate and makes it a handy reference book concerning the lumber interests of the Pacific coast. A part of the directory contains tables of measurements, state and federal laws with reference to timber lands, towage rates, log scales, etc.

American Car & Equipment Company's Shops at Chicago Heights.

The American Car & Equipment Company was organized about two years ago, the company starting from a modest beginning as brokers and dealers in rebuilt and remodeled railroad equipment. Through the sales department, equipment has been furnished to railroads and private car owners throughout the United States and Canada, and consignments have also been made to foreign countries.

About a year ago, a tract of land was bought at Chicago Heights, 27 miles south of Chicago, which is convenient to the tracks of the Michigan Central, the Chicago, Lake Shore & Eastern, the Chicago Terminal Transfer Company and the Chicago & Eastern Illinois. The ground acquired by the company covers 10 acres and it is proposed to add five additional acres. The present tract is 450 ft. wide and 1,120 ft. long. The present capacity is sufficient to make repairs to 10 freight cars per day, but this is to be gradually extended with the increase of business. The number of men employed at present is 250. The work done consists almost entirely of heavy repairs and extensive overhauling of bad order equipment, which has been done for the Rock Island, the Eastern Illinois, the Illinois Central, and other western lines.

One feature of the business which the company is introducing is the equipping of old wooden frame cars with new steel underframes. They build a complete new steel underframe from their own designs, making virtually a new car. The car shop at present is a combined repair shop and planing mill, but it is proposed to build a separate planing mill and use the present structure entirely for car repairs. The building has a capacity of 50 cars under roof, and the total trackage of the company within its own grounds is sufficient to handle over 300 cars. The shop is equipped with all the necessary machinery for freight car repairs and the machinery is driven by electric motors. A convenient and economical feature of the plant is the fact that it does not require a power house; the company is able to use electric current purchased from the North Shore Electric Company. An electrically-driven air compressor furnishes pneumatic power for small tools and for testing the air-brakes, the shop being piped for this purpose.

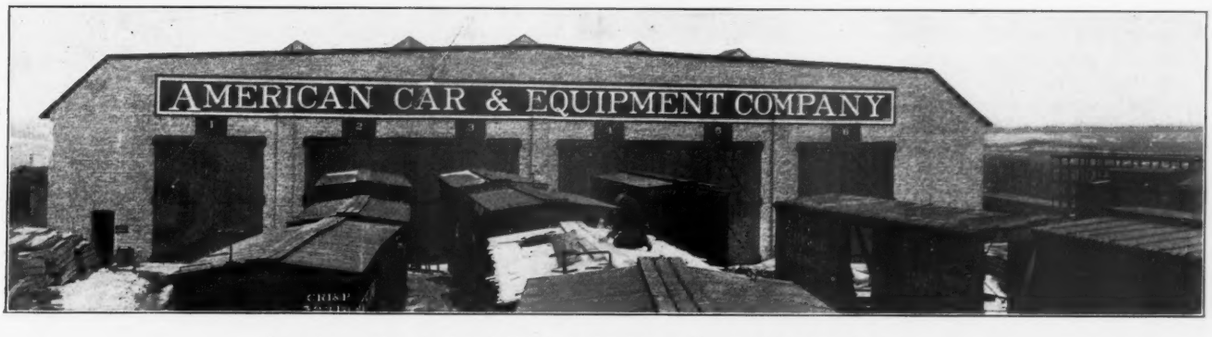
The President of the company, H. H. Sessions, is well-known as having been for 11 years General Manager of the Pullman Company's Works at Pullman, Ill., and since 1896 Vice-President of the Standard Coupler Co., New York, which position he still holds. I. J. Kusel, Vice-President and General Manager, was for a number of years in mechanical and electrical lines. C. R. Powell, Second Vice-President and General Superintendent, was for a number of years with the Illinois Central as Traveling Car Foreman. He has a wide experience in the construction and repair of railroad equipment. W. H. Horine, Secretary and Treasurer, is well-known in the financial world, having been associated both under Mr. Eckels and Mr. Dawes as Bank Examiner for the districts of Illinois and Missouri. B. B. Barry, Purchasing Agent and General Sales Manager, was for several years private secretary to the General Manager of the Chicago & Alton, and later Treasurer of the W. K. Kenly Company. The directorate comprises a number of railroad supply men, including M. A. Garrett, A. D. Warner and S. T. Rowley. The company is developing a large business, and the shops will be extended on conservative lines to meet such demands.

Pintsch Light Statistics.

The Safety Car Heating & Lighting Co., New York, has just received from the Julius Pintsch Aktiengesellschaft, Berlin, Germany, the following statistics showing the progress in the adoption of the Pintsch system of lighting:

Cars and Locomotives Equipped with Pintsch Lighting System.

	Oct. 1, 1903.		April 1, 1908.	
	Cars.	Locomotives.	Cars.	Locomotives.
Germany	42,471	5,583	52,846	7,958
Denmark	45	.....	45	.....
England	19,256	.....	20,459	.....
France	6,837	.....	11,914	.....
Holland	3,663	5	3,978	5
Italy	1,537	.....	1,552	.....
Switzerland	392	2	398	2
Portugal	67	.....	67	.....
Spain	38	.....	38	.....
Austria	5,003	.....	6,465	.....
Russia	3,467	132	4,428	329
Sweden	731	53	944	67
Servia	216	.....	219	.....
Bulgaria	98	.....	154	.....
Turkey	114	.....	119	.....
Egypt	148	.....	382	.....
United States	21,380	.....	32,455	.....
Canada	393	.....		
Brazil	978	31	1,324	31
Argentine	1,133	.....	1,548	127
Chile	46	.....	46	.....
India	10,312	.....	13,686	60
Australia	2,396	.....	2,945	.....
Japan	150	.....	180	.....
Total	120,871	5,806	156,172	8,579
Increase, in 4½ years	.....	.....	35,301	2,773
Av. increase per year	.....	.....	7,845	616
Total av. equipmt per yr	.....	.....	8,461	



American Car & Equipment Company's Shops, Chicago Heights.

Good and Bad Creosoting.

Entirely too frequently, engineers are confronted with what are supposed to be glaring examples of the failure of creosoted piling, especially where such work has been used for marine construction. This has occurred most often on the Pacific coast, where it seems the average creosoted piling has been a failure and all such failures are committed in the name of creosoted piling.

As we are compelled to use different kinds of steel in differing requirements for steel construction, just so are we obliged to use different grades of creosote for the different conditions to which creosoted timbers are to be subjected. That there are various qualities of creosote used in treating timbers in the United States is known to all engineers, but that there are special creosote oils to be used in special work is an idea that though new to most people, yet is only an advance made in meeting the requirements for treated woods.

An ignorance of just what part creosote oil plays in prolonging the life of timbers, and a scarcity and consequent rise in price of oil, brings to the minds of some people an economy in blending creosote oils (those whose origin is coal tar) with other oils, possibly petroleum, water-gas tar oils and sometimes wood-creosote.

The results are many and disgraceful. Creosote of itself has a fairly high viscosity and, when mixed with foreign oils containing insoluble residues, the viscosity point is usually raised, thereby increasing the difficulties of easy impregnation, upon which depends thorough penetration.

Supposing though that the treatment with such substitutes did give the required results for absorption and penetration, the timber, nevertheless, is impregnated with an oil of low specific gravity, the greater proportion of which is water soluble and with a material whose antiseptic properties which if present at the beginning are so leached out by water that there is nothing left but a small quantity of insoluble, non-antiseptic residue. This offers no barrier at all to the wood borers, namely, the teredo or the limnoria, consequently in less than four or five years the piling is completely honeycombed and therefore useless.

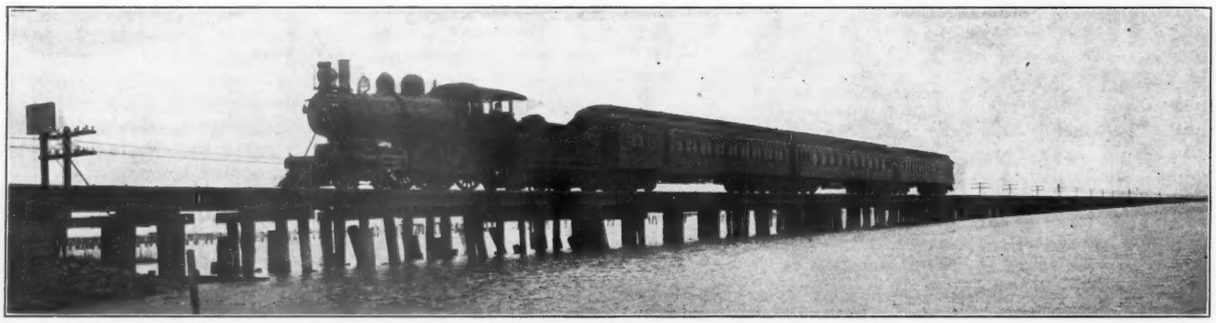
The present structure connecting the mainland and Galveston island is a single-track bridge built on piling with a draw in the center. The accompanying cut gives some idea of its magnitude, containing over 4,000 piles. The piles for this bridge were treated by the International Creosoting & Construction company at what was their Galveston plant, since removed to Beaumont, Texas. The piles were all of southern pine treated with 24 lbs. of anhydrous creosote oil per cubic foot. They were practically all green when treated, most of them coming direct from the stump and seasoned by steaming by the same process and methods now in vogue by that company. Thoroughly impregnated piles sink if allowed to fall in the water, and this cost the pile driver several sticks of piling.

At the time this bridge was built, there was much doubt of the economic usefulness of creosoted piling, but the International Creosoting & Construction Company were so certain of the lasting qualities of their own work that they gave a ten year guarantee on the bridge, promising to replace any stick of piling, which at the end of ten years showed any traces of decay or deterioration. The bridge was built in 1895. In 1905, when the official inspection was made in anticipation of its final acceptance, not one stick of piling had to be replaced. This condition was satisfactory to all concerned, first to the treating company as proof of its own successful work, and second to the railroad company as an evidence of the fact that creosoted piling when honestly and thoroughly treated are safe from the teredo, and that a railroad built on such a structure is not a menace to the lives of the people who travel over it.

It is interesting in this connection to examine the volume of traffic to which this bridge has been subjected, because by many engineers piling, in which 24 lbs. of creosote has been injected, is considered to have lost the greater percentage of its strength. Laboratory tests are always available for minor tests, yet the actual subjection of a structure to every-day tests for 13 years is more liable to give the engineer the evidence that he wants. This single track is the means of transporting all the export material that has caused Galveston to become the second export city in the United States. The following is a table of the number of cars that have gone over this bridge since the year 1900. The figures for 1900 are for the months of October, November and December, and for 1908 are for the months of January to April, inclusive. Each engine is figured as three cars.

Year.	No. of cars.	Year.	No. of cars.
1900 (4 mos.)	83,572	1906	349,942
1901	247,118	1907	352,532
1902	245,422	1908 (4 mos.)	105,889
1903	320,116		
1904	293,454	Total	2,327,507
1905	329,462		

Early this year there happened the lowest water in years in the bay between Galveston island and the mainland. The water was so low that two-thirds of all piles were exposed to the mud line. This gave a chance for a complete examination of each pile and the official report on this inspection showed that not one pile originally furnished by the creosoting company was in any way decayed.



Galveston Trestle With Piles Creosoted in 1895.

There were three things of special importance in treating the piling for this bridge:

First, the timber was freshly cut and consequently there was the minimim likelihood of any decay being present in the piling previous to treatment.

Second, a high grade of oil was used. It was a London oil of a good specific gravity, of an average amount of napthalene and of a good percentage of anthracene oils.

Third, and most important of all, each charge of piling received the required amount of oil (24 lbs.) per cubic foot. Therefore the requirements of creosoted piling are, good timber, free from signs of decay, a high grade oil and of a sufficient guaranteed quantity.

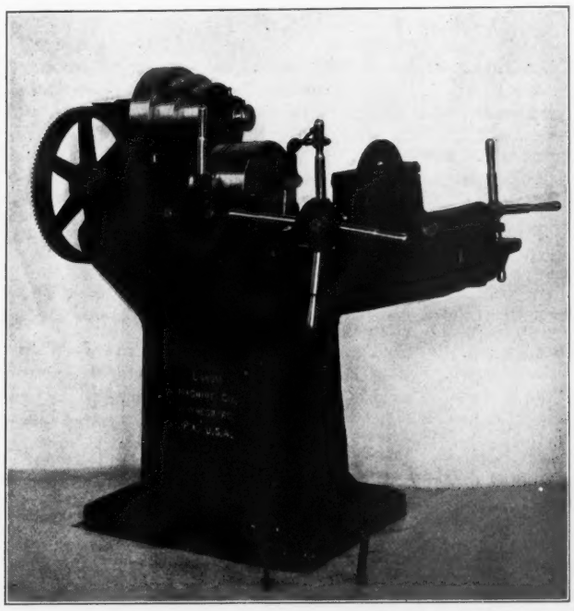
Bureau of American Manufacturers in Europe.

The Bureau of American Manufacturers in Europe has recently been organized and is open to all reputable American firms. Offices have been leased in London, and foreign buyers visiting that city will be invited to attend the exhibition of American goods which will be carried permanently. A monthly bulletin will be sent to buyers in various parts of the world, and other advertising methods will be employed.

Salesmen will be engaged who will look after the interests of the members. Reports between Europe and America are to keep the members in touch with foreign conditions. The London address is 25 Cannon street, care of Pitt & Scott, Ltd., and the New York address is 35 Broadway, care of the same firm.

Landis All Steel Die Head.

The two illustrations shown herewith illustrate the new Landis bolt cutter and all-steel die head. This machine is made by the Landis Machine Co., Inc., Waynesboro, Pa., in single, double and triple head patterns for either belt or



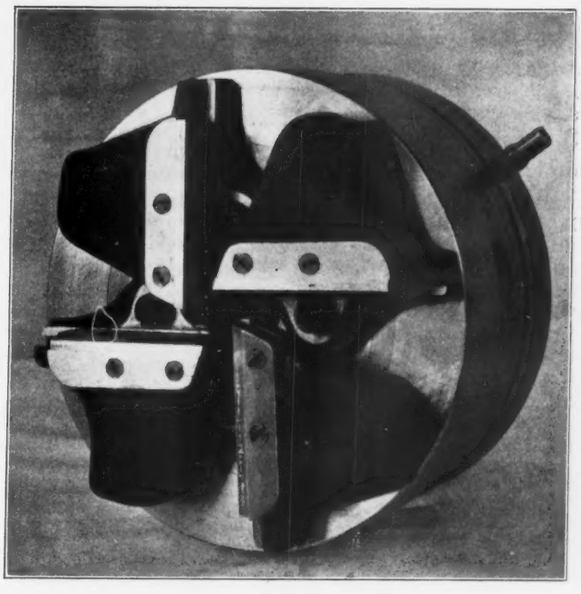
Landis Single Head Bolt Cutter.

motor drive, suitable for threading bolts of diameters up to two inches. All of these machines are equipped with the all-steel die head shown in the illustration, which is a feature of them.

This die is composed of four chasers which are made from flat pieces of steel with the threads milled their entire length on the flat side. The throat is formed by beveling the front edges of the chasers, giving uniform shape. The life of the die is said to be long, especially since none of the metal of the die needs to be hobbed away and it is necessary to grind but a small amount of the chaser at each sharpening. The teeth of the chaser are hardened over their entire length and when the cutting edges become dull, it is only necessary to grind off the end of the chaser. The lip or rake angle at the throat of the die is ground according to the metal which it is to cut, resulting, it is claimed, in chips being similar to those from a lathe or planer tool. Each chaser is clamped in a steel holder by means of a dove-tailed slot, which holds it rigidly, preventing any sliding movement. A spring is located back of each chaser holder in such a manner as to take up any lost motion that may occur in the head. This prevents the dies from having any play which would cause irregular threads. The chasers are set to cutting position after grinding, using a small hook gage. A feature of this machine is that through the use of these long chasers it is unnecessary to have lead screws on the machine, as the die has positive lead within itself. The front teeth do the cutting while the back teeth extend across the cutting line and have a bearing on the work a little back of the face of the chasers. Thus the four chasers form a permanent hardened lead nut which at all times draws the rod in at the correct pitch of the die. Each grinding of the die gives a new leading surface as well as a new cutting edge. The error in lead is reduced to a minimum and the pitch of the screw will always be exactly the pitch of the die. This combination die and lead nut overcomes the trouble resulting in machines having lead screws, as there is often a difference in the pitch of the lead screw and die. This feature is of particular advantage in cutting a very long bolt. It is possible to cut an accurate thread as long as 4 ft. without the aid of a lead screw, giving a correct pitch within 0.02 of an inch.

The hobs for milling these chasers are made on special lathes with backing-off attachments for relieving the teeth. The chasers are rigidly supported and have correct clearance so as to prevent any variations which may occur in the threaded work. They are supported on the central spindle, and also at the outer edge of the head, which makes it impossible for the chasers to move away from the work. The backward and forward movements of the carriage open and close the die, and this can be adjusted to operate for cutting any length of threads within the range of the machine. The die is locked by a vertical pin with angle head which drops in behind a hardened plate, being held there by a flat spring. In opening, the ring which carries the horizontal pin moves backward, raising the vertical pin until it unhooks, allowing the die to open. The carriage is gibbed to the bed so that it can be readily adjusted to compensate for wear. Side thrust is eliminated, since the vise has guides placed just above the bolt line with clamping screw. This vise is adjustable in all directions so that the work is easily brought opposite the center of the die. These machines are provided with rotary oil pumps, through which the flow of oil is automatically regulated. Cone pulleys are mounted on the top of the machines, and are out of the way of dirt and oil and take up the least possible room.

These machines are also well adapted for pipe threading and all classes of nipple work. The chasers are so held that they can be run close to the nipple grips, making it possible to thread very short pieces of pipe. Special grips are provided for nipples with threaded gripping surface and so arranged that all sizes of pipe within the range of the machine



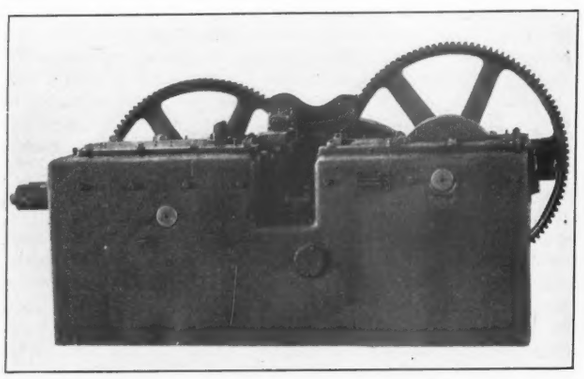
All Steel Die Head.

can be held with one set of grips. Special corrugated grips are furnished for longer pipes. The taper in pipe threads is provided for in the holder, though no taper can be cut longer than the width of the chasers. For use in connection with this class of work, a pipe reaming device is provided for reaming the pipe or nipples at the same time that the thread is being cut, which saves an extra operation. This attachment can be put on any of these machines. The machine may also be used for nut tapping. Four tap chucks replace the chasers in the die head forming a rigid holder for the tap. The tap is released in the same manner as in

opening the die head for removing a threaded bolt. It is not necessary to stop the machine to remove or place a tap.

Hot Pressed Nut Machine.

The accompanying illustration shows a machine for making hot pressed nuts, recently placed on the market by the Acme Machinery Co., Cleveland, Ohio. This machine has been de-



Acme Hot Pressed Nut Machine.

signed especially to meet the requirements of modern high-speed production and low repair cost. The bed is a single steel casting, said to be four times as strong as an iron bed of the same weight. The gears are steel castings with cut teeth. The cutter, crowner and piercer slides are also steel castings. The steel operating cams with hardened tool steel faces, run against steel rollers. When the piercer is punching the nut the rest of the mechanism ceases its motion, so that there is never any pressure on the nut during the moment of piercing, thus lessening the tendency to strip or score the punch or piercer. At every revolution the cams dip into oil which is contained in cored vessels in the bed of the machine. The new movements introduced in this machine, together with its weight and power, render it possible to make steel nuts on this machine equally as readily as iron nuts.

United States Steel Corporation.

The strong features of the statement of the United States Steel Corporation for the quarter ended September 30 were the increase of nearly $7,000,000 in earnings and 108,000 tons in unfilled orders as compared with the preceding quarter, in which centers the chief interest. This is the first increase in unfilled tonnage since December, 1906. On December 31, 1906, unfilled orders aggregated 8,489,718 tons, since which time they have been decreasing at the rate of nearly 1,000,000 tons a quarter.

The following table gives the unfilled tonnage at the close of each quarter from June 30, 1902, to June 30, 1908, with the net earnings and per cent. of unfilled tonnage to earnings:

Quarter ended :—	Unfilled tonnage.	Net earnings.	Per cent. ton. to earnings.
September 30, 1908.....	3,421,977	$27,106,274	12.6
June 30, 1908.	3,313,876	20,265,756	16.3
March 31, 1908	3,765,343	18,229,005	20.1
December 31, 1907.....	4,642,553	32,553,995	14.3
September 31, 1907.	6,425,008	43,804,285	14.7
June 30, 1907.	7,603,878	45,503,705	16.7
March 31, 1907	8,043,858	39,122,492	20.5
December 31, 1906.....	8,489,718	41,750,125	20.5
September 30, 1906	7,936,884	38,114,624	20.8
June 30, 1906.....	6,809,589	40,125,032	16.9
March 31, 1906	7,018,712	36,634,490	19.1
December 31, 1905	7,605,086	35,216,063	21.5
September 30, 1905	5,865,377	31,240,582	12.3
June 30, 1905.....	4,829,655	30,305,116	15.9
March 31, 1905.....	5,579,560	23,025,895	24.2
December 31, 1904	4,696,203	21,466,203	21.8
September 30, 1904.....	3,027,436	18,773,932	16.1
June 30, 1904.....	3,192,277	19,490,725	16.3
March 31, 1904.....	4,136,961	13,445,231	30.7
December 31, 1903.....	3,215,123	15,037,181	21.3
September 30, 1903.....	3,278,742	32,422,954	10.1
June 30, 1903.....	4,666,578	36,642,308	12.7
March 31, 1903.....	5,410,719	25,068,707	21.6
December 31, 1902	5,347,523	31,985,759	16.7
September 30, 1902	4,843,007	36,945,488	13.2
June 30, 1902	4,791,993	37,662,058	12.7

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

H. A. Coomer has been appointed Auditor of the New Mexico Central, with office at Santa Fe, N. Mex.

Frank O. Waldo has been appointed Auditor of the Michigan Central, succeeding A. Judson Burt, deceased.

J. P. Reeves has been elected Assistant Treasurer and Assistant Secretary of the Chicago & Eastern Illinois at Chicago. T. D. Head remains Assistant Treasurer and Assistant Secretary at New York.

W. J. Horrigan, whose resignation as Freight Claim Agent of the Northern Pacific was announced in our issue of October 9, has been elected Secretary of the Northwestern Ice & Fuel Co., St. Paul, Minn.

Operating Officers.

A. G. Whittington has been appointed Trainmaster of the Fort Worth division of the International & Great Northern at Mart, Tex.

J. F. Corbett has been appointed Chief Despatcher of the Oregon Railroad & Navigation Co. at Spokane, Wash., succeeding J. Costello, resigned.

R. L. Hearon, Traffic Manager of the Colorado & Wyoming and the Crystal River Railroad, has been appointed General Manager, a new office, with headquarters at Denver, Colo.

C. W. Kinney, whose appointment as Superintendent of the Auburn division of the Lehigh Valley has been announced in these columns, began railroad work as telegraph operator on the Lehigh in 1886. He was made Train Despatcher on the New York division in August, 1892, at which time the Train Despatcher's office was at Perth Amboy, N. J. Later when the office was transferred to Easton, Pa., in March, 1898, he was transferred with the office, and in June, 1900, was promoted to the position of Chief Despatcher of the New Jersey and Lehigh divisions. Four years later he was made Trainmaster, and in December, 1904, he was appointed Superintendent of the Pennsylvania division, with office at Sayre, Pa., which position he held until this division was abolished, when he was appointed Superintendent of the Auburn division, with office at Auburn, N. Y.

C. W. Kinney.

G. W. Everett, Assistant to the General Manager of the Mexican Central, has been appointed Superintendent of the Aguascalientes division, with office at Aguascalientes, Aguas., Mex., succeeding J. S. Reddick.

M. Nicholson, Superintendent of the Dakota division of the Great Northern, has been appointed Superintendent of the Butte division, with office at Great Falls, Mont., succeeding P. C. Allen, who has been appointed Superintendent of the Northern division, with office at Crookston, Minn., succeeding F. S. Elliot, who succeeds Mr. Nicholson.

J. W. Ryan, whose appointment as General Superintendent of the Salt Lake & Ogden has been announced in these col-

umns, began railroad work as a water boy for a section gang on the Delaware division of the Erie. Later, when his parents moved to Elmira, N. Y., he was employed as brakeman on the Elmira division of the Pennsylvania. In 1881, he went west and was in the service of the Union Pacific for 20 years as conductor, Yardmaster and Trainmaster. He was next on the Colorado & Southern, and was then appointed Trainmaster at Little Rock, Ark., of the Choctaw, Oklohoma & Gulf, now a part of the Chicago, Rock Island & Pacific. On October 1, 1908, he was made General Superintendent of the Salt Lake & Ogden.

F. E. McCormack, whose appointment as Superintendent of the Ontario division of the New York Central & Hudson River has been announced in these columns, was born at Lamson, N. Y. After a public school education he began railroad work in 1872 on the Delaware, Lackawanna & Western as water boy, and later became an operator. In 1884 he was made an operator on the Rome, Watertown & Ogdensburg, now a division of the New York Central. By 1889 he had become a despatcher and five years later was promoted to Chief Despatcher. In 1896 he was appointed Trainmaster, and in 1904 was promoted to Chief Trainmaster. Three years later he was appointed Assistant Superintendent, which position he held until his recent appointment as Superintendent.

Traffic Officers.

C. H. Walter has been appointed Traveling Freight Agent of the Pere Marquette, with headquarters at Toledo, Ohio.

W. A. Nelson has been appointed General Agent of the Erie at Jamestown, N. Y., succeeding T. F. Powell, transferred.

F. T. Grant has been appointed Traveling Passenger Agent of the Canadian Pacific at Syracuse, N. Y., succeeding D. H. Morse, resigned.

H. J. Neff has been appointed Traveling Freight Agent of the Trinity & Brazos Valley at Houston, Tex., succeeding J. N. Steele, resigned.

F. D. Burroughs has been appointed Chief of the Tariff Bureau of the Chicago, Milwaukee & St. Paul at Chicago, succeeding C. N. Turner, resigned to accept service elsewhere.

John G. Jones has been appointed General Agent for the states of Tennessee and Mississippi for the Illinois Central and the Yazoo & Mississippi Valley, with office at Memphis, Tenn.

W. F. Rogers, Soliciting Freight Agent of the Vicksburg, Shreveport & Pacific at New Orleans, La., has been appointed Soliciting Freight Agent of the Queen & Crescent Despatch at New Orleans.

R. A. Belding has been appointed General Agent, Freight Department, of the Chicago Great Western, with office at 305 Broadway, New York, succeeding W. H. Burk, resigned to engage in other business.

J. H. Cummings has been appointed Traveling Agent of the Chicago Great Western for the state of Nebraska, with office at 214 South Thirteenth streeet, Lincoln, Neb., succeeding C. A. Musselwhite, resigned to engage in other business.

W. S. Howell, General Eastern Agent of the Chicago, Milwaukee & St. Paul at New York, has been appointed Assistant General Freight Agent at Chicago. George A. Blair, Commercial Agent at Pittsburgh, Pa., succeeds Mr. Howell. J. H. Skillen, Commercial Agent, succeeds Mr. Blair.

Joseph Lallande, Chief Clerk in the General Freight Office of the Morgan's Louisiana & Texas and the Louisiana Western, at Atlanta, Ga., has been appointed Assistant General Freight Agent at New Orleans, La. J. F. Terrell, Traveling Freight and Passenger Agent at New Orleans, succeeds Mr. Lallande. G. E. Guedry, Division Freight and Passenger Agent at Lake Charles, La., succeeds Mr. Terrell. D. Asbury, Traveling Freight Agent at Atlanta, Ga., succeeds Mr. Guedry.

The following appointments have been made on the Missouri Pacific and the St. Louis, Iron Mountain & Southern: C. A. Parker has been appointed Traveling Passenger Agent at New York; H. C. Young has been appointed Traveling Passenger Agent at Pittsburgh, Pa.; H. L. Pease, City Passenger Agent at Chicago, has been appointed Traveling Passenger Agent at Chicago. H. C. McKenty succeeds Mr. Pease. J. F. Govan has been appointed Traveling Passenger Agent at Chicago; Paul Escott has been appointed Traveling Passenger Agent at Chattanooga, Tenn., succeeding I. E. Realander, resigned; Elmer Smith has been appointed Passenger and Ticket Agent at Memphis, Tenn., succeeding C. E. Roundtree, resigned; W. E. Fitch has been appointed Southwestern Passenger Agent at San Antonio, Tex.; J. H. Ginet, Jr., has been appointed Traveling Passenger Agent at Denver, Colo.

Engineering and Rolling Stock Officers.

F. J. Hemphill has been appointed Signal Supervisor of the Illinois division of the Chicago, Rock Island & Pacific, with office at Ottawa, Ill.

G. W. Trout, Signal Engineer of the St. Louis & San Francisco, has been appointed Signal Supervisor of the Missouri division of the Chicago, Rock Island & Pacific, with office at Cedar Rapids, Iowa.

J. M. Lee, Vice-President of the Percival Wood Preserving Co., Houston, Tex., has been appointed Engineer of the State Corporation Commission of Oklahoma, effective November 1. His headquarters will be at Guthrie.

Owing to the retirement on pension of Allen Vail, Master Mechanic, Buffalo shop, of the Pennsylvania, the jurisdiction of J. M. James, Master Mechanic, Olean shop, will be extended to include the entire Buffalo division, effective November 1.

Alfred R. Kipp has been appointed Superintendent of Motive Power and Cars of the Wisconsin Central, succeeding W. G. Menzel, resigned. Effective November 1. Mr. Kipp was formerly Master Mechanic of the Wisconsin Central and has also been with The Arnold Co., Chicago.

Edward M. Sweetman, whose appointment as Master Mechanic of the Southern Railway has been announced in these columns, was born at Joplin, Mo., in 1874. After a public school education he began railroad work October 23, 1889. For two years he was a brake foreman on the Southern at Knoxville, Tenn., and for a year after that gang foreman. For the next year and a half he was Erection Shop Foreman at Knoxville, Tenn., and later was appointed General Foreman on the Southern Railway at Asheville, N. C.

Purchasing Officers.

H. L. Thompson has been appointed Division Storekeeper of the Atchison, Topeka & Santa Fe, succeeding T. A. Pratt, transferred.

OBITUARY.

Richard Hayes, who was General Foreman of Construction for the Chicago, Milwaukee & St. Paul, died at Butte, Mont., on October 20, following an operation.

J. A. Woodson, formerly Superintendent of the Valley division of the St. Louis, Iron Mountain & Southern, died at his home at Little Rock, Ark., on October 19. He was born in Greensboro, N. C., July 14, 1848.

Ossian Guthrie died at his home in Chicago on October 25. He was born in Turin, N. Y., in 1826. He was an inventor and geologist and was instrumental in making the plans for the Chicago drainage system. He was an honorary member of the Western Society of Engineers.

Charles Arthur Smith, Principal Assistant Engineer of the Chicago & Western Indiana, died from an operation for appendicitis on October 20. He was born in Naperville, Ill., in 1880, and obtained his education at Northwestern College. He began railroad work as rodman and draftsman on the Vandalia. In 1902 he went to the Chicago & Western Indiana as draftsman. In 1904 he was appointed Assistant Engineer of that road, which position he held until about six months ago, when he was made Principal Assistant Engineer. As Assistant Engineer he did important work, having direct charge of the Fifty-first street engine house and engine terminals at Chicago. He was an able engineer and showed considerable executive ability. His research in engineering matters was extensive and his death was particularly sad because he had been mar-

ried only a month and had returned to his duties just one day before he was stricken.

Samuel Millican, Superintendent of Motive Power and Machinery of the Houston & Texas Central, the Houston, East & West Texas, and the Houston & Shreveport, died at Dallas, Tex., on October 22, following a paralytic stroke. He was born on Staten Island, N. Y., December 23, 1854. At the age of 21 he entered the employ of the Houston & Texas Central as fireman. In December, 1877, he was made an engineman, which position he held for 20 years. In 1897 he was appoint-Traveling Engineer and in 1902 he resigned to become Master Mechanic of the Houston, East & West Texas. He returned to the Houston & Texas Central as Acting General Foreman of Shops in July, 1903, and in December of the same year was appointed General Foreman. In March, 1905, he was appointed Acting Superintendent of Motive Power and Machinery of the Houston & Texas Central and the Houston, East & West Texas, and on January 1, 1906, he was given full charge as Superintendent of Motive Power & Machinery.

Major William A. Hankins, Principal Locating Engineer of the Carolina, Clinchford & Ohio, died on August 23 from heart failure. He was born in 1849, and graduated with honor from the Virginia Military Institute with the degree of Civil Engineer in 1873, and later studied at William and Mary College, Williamsburg, Va. After a wide engineering experience he became connected with work on the Tidewater, now the Virginian Railway, in 1904. In 1905 he became Principal Locating Engineer of the South & Western, now the Carolina, Clinchfield & Ohio. The location of this line through the Blue Ridge mountains is a work in itself which will stand a monument to the engineering ability of Major Hankins. His work of locating the line south of the Blue Ridge is equally noteworthy. The original line, after surmounting a long adverse grade, was planned to pass through a 4,000-ft. tunnel. The line was located after a study extending over four years, but after a short examination Major Hankins re-located the line as it is now being constructed, eliminating the tunnel work through wet and difficult ground and substituting for it a tunnel 1,100 ft. long through dry material, and shortened the line by five miles greatly reducing its cost. Major Hankins lived long enough to see the Blue Ridge line completed by the contractors, it being finished two weeks before his death.

Railroad Construction.

New Incorporations, Surveys, Etc.

Alberta Central.—See Canadian Pacific.

Bessemer & Lake Erie.—Press reports indicate that the work of double-tracking the line from Pittsburgh, Pa., to Conneaut Harbor on Lake Erie, will involve the putting in of thousands of yards of concrete and the construction of several new bridges. Filling and grading along the line has been progressing for several months. Between Butler and Greenville, double-tracking has been about completed, but south of Butler a few stretches of single track yet remain to be closed. (July 24, p. 600.)

Canadian Pacific.—The contractors, it is said, have finished double-tracking the line from Winnipeg, Man., to Fort William, Ont., 420 miles, and turned the line over to the Canadian Pacific. (Sept. 4, p. 888.)

It is said that this company is investigating the route for a proposed line from Red Deer, Alb., west to Rocky Mountain House, about 70 miles. The Alberta Central has been granted a charter to build such a line not to exceed 70 miles, and a subsidy of $200,000 from the Dominion government. It is thought the Canadian Pacific will take over the charter of the Alberta Central.

Canadian Western.—Application made for incorporation to the Dominion Parliament. The company plans to build a line from a point on the International boundary in Alberta, north to the Crow's Nest Pass line of the Canadian Pacific, between Cowley and Pincher Creek, thence northwest following the valley of the north fork of Old Man river to the Livingston range of mountains; thence through a pass at that point, northerly by the valley of the Livingstone river to High river, and then northeasterly to Calgary; also from a point on the main line near its junction with the Livingstone river to the Rocky mountains west of Goulds Dome, and through a pass in the mountains to the valley of the Elk river, following the valley of that river southerly to a junction with the Canadian Pacific and the Great Northern near Michel. Hough, Campbell & Ferguson, of Winnipeg, Man., are the solicitors.

Cuyuna Range.—Incorporated in Minnesota with $100,000 capital to build from Deer Wood, on the Northern Pacific, in Crow Wing county, east about 125 miles to Duluth, Wis., and Superior. The office of the company is at Duluth. The incorporators include: Cuyler Adams, of Deer Wood; H. B. Fryberger and H. C. Fulton, of Duluth.

Dakota Southern.—Incorporated in South Dakota, with headquarters at Lemmon, S. Dak., and Dickinson, N. Dak. The company proposes to build a line from Rapid City, S. Dak., northeast to Lemmon, S. Dak., thence northwest to Williston, N. Dak., about 500 miles. The incorporators include: C. F. Merry, John Reisbach, of Dickinson, N. Dak.; J. C. Johns, of Hettinger, N. Dak.; G. L. Lemmon and E. C. Delehan, of Lemmon, S. Dak.; L. E. Gaffy and B. Morse, of Pierre, S. Dak.

Erie.—This company on Oct. 21 put in service the first ten miles from Guymard, N. Y., east to Howells, on the new 42-mile low grade freight line being built by the Erie & Jersey from Guymard east to Highland Mills. It is expected that the remaining 32 miles will be finished and ready for operation early in 1909. (Oct. 16, p. 1176.)

Erie & Jersey.—See Erie.

Evansville & Southern.—It is reported in Evansville, Ind., that the directors of this company announced at a meeting last week that the company will begin work early next spring on the extension of the line north to Vincennes, Ind., and eventually to Terre Haute.

Gulf Coast Traction.—It is announced that this road will begin at once the extension of its line from Gulfport, Miss., west to Pass Christian. This road was originally planned to extend to Bay St. Louis through Pass Christian, but it is said that legal proceedings stopped this work. Now that these matters have been arranged the work will begin at once and the line will be built as originally planned to Bay St. Louis.

Hudson & Manhattan.—This company is soon to build an extension from the Pennsylvania station in Jersey City to the Communipaw station of the Central Railroad of New Jersey. At present passengers alighting at the Communipaw station cannot conveniently reach Jersey City except by crossing the river twice, once to the Liberty street terminal of the Jersey Central and then back into Jersey City from the Cortlandt street ferry of the Pennsylvania. The maps for the extension have already been filed, but the work on the new connection will not be started until the completion of the down town main line tubes from Hoboken to the Hudson Terminal buildings. By making this short extension every railroad terminating in Jersey City will have tunnel connection with Manhattan. President McAdoo is quoted as having said that the main line tunnels from Hoboken and from the Pennsylvania station should be completed and trains should be running by May of next year; and also that there remained gaps of less than 1,000 ft in the two downtown tubes. Work on the Cortlandt street terminal tunnel is proceeding at the rate of 10 ft. a day, but the Fulton street progress is less rapid as the bottom of the tunnel in this section is in solid rock.

Kansas City, Ozarks & Southern (Electric).—An officer writes regarding the line from Mansfield, Mo., to Ada, 14 miles, that this company has finished from 85 to 90 per cent. of the grading work and that the rest of the grading will be finished in 30 days. The Ozark Southern Construction Co., of Mansfield, is the contractor. Rails have all been bought and track laid on about four miles. Work has been started erecting the poles for the overhead wires, and it is expected to have half of this work finished in about 30 days, as well as an emergency steam plant. Electricity is to be generated by water power on the Bryant river. Albert Parker, Presi-

dent; J. B. Quigley, Chief Engineer, Mansfield. (Aug. 7, p. 693.)

MACKENZIE RIVER POWER & RAILWAY CO.—Incorporated in Portland, Ore., with a capital stock of $100,000, to build an electric line from Eugene, Ore., east to Belknap Springs and another from Blueriver, on the Mackenzie, north to Luckyboy, from which latter point there will be a branch southeast to Foleysprings. The incorporators include C. Sengstake, O. A. Lyman and Z. Snow, all of Portland.

MARIANNA, AUBREY & WESTERN.—Incorporated in Arkansas to build a line from Marianna to Aubrey in Lee county, nine miles. The chief promoter is Hon. J. T. Robertson, of Marianna. H. N. Pharley, H. F. Roleson and J. R. Jarrett are also interested. (Oct. 23, p. 1227.)

MATANE & GASPE.—An officer writes that this company was organized to build from Metis, Que., east to Gaspe, a port at the head of the bay of the same name, where there is a harbor 20 miles long by five miles wide open for navigation from the end of April to the middle of January. The company proposes to build from a junction with the Intercolonial at or near St. Octave de Metis via Matane to Gaspe; also westward from the junction with the Intercolonial to Rimouski; and on the eastern end from Gaspe to Griffin Cove, a total of 286½ miles. It is intended to eventually build a branch from the main line near Metis southwest to a connection with the line now being built by the Grand Trunk Pacific near Glazier lake. Right of way is nearly all secured and contract has been given to the H. J. Beemer Co., Quebec, for building the first section of the main line from a point near St. Octave de Metis east to Matane, 31 miles. The work on this section will be comparatively light, as the route follows a highway for nearly all the way. Work is to be started at four different points and it is expected this section will be finished within a few months. The second section to be built will be from Matane east to Ste. Anne des Monts, 60 miles, and, like the first section, will average about a quarter of a mile from the shore. This work will be easy. Contract is to be let shortly for the entire remaining section from Ste. Anne des Monts east to Gaspe, 127 miles. The work will be heavy between Ste. Anne des Monts and Mont Louis, 38 miles. Work on the branch to the Grand Trunk Pacific is to be started as soon as that company has finished its line to Temiscouata Junction, near Glazier lake. It is intended to use steam as the motive power for freight service, and electric cars for passenger service. The company has been allowed to amend its charter, permitting it to operate steamers between Montreal, Quebec, the north shore and various places on its main line. Senator P. A. Choquette, President, Quebec, and P. E. Hunter, Chief Engineer, Ste. Flavie, Quebec. (Oct. 16, page 1176.)

NEBRASKA TRACTION & POWER CO.—An officer writes that this company, recently incorporated in Nebraska, plans to start work at once on the first section of its projected line from South Omaha, Neb., southwest via Ralston to Papillion, seven miles. The General Contraction Co., of Omaha, has the general contract. M. Uhl, Seventeenth and Jackson streets, Omaha, is President of the railway company, and R. H. Oliver, Omaha, is Chief Engineer.

NEW YORK, NEW HAVEN & HARTFORD.—The report of this company for the year ended June 30, 1908, which was reviewed in our columns October 9, says, under date of September 18, that the six-tracking of the Harlem River & Port Chester has been continued and sections of the new tracks put in service. All the bridges are about finished and 44 per cent. of the total work was completed during the year. The double-track work between Seymour, Conn., and Waterbury was finished, except for the Naugatuck passenger station, which, however, was to be finished about the end of September of this year. The new elevated main tracks in Waterbury have been put in service and work on the new passenger station is progressing; a considerable amount of work remains to be done on the new freight houses and yard, and on grading streets leading to the passenger station. It is expected to have all these improvements finished by April, 1909.

Second track has been laid between Danbury, Conn., and Hawleyville; at the latter place, the work includes changes in tracks and extension of freight yard, which, it was expected, would be finished by October, 1908.

At Hartford, Conn., improvements were made at Morgan street freight yard; work is now under way on elimination of grade crossing at Walnut street, which, it is expected, will be finished during 1908.

The second track construction between Waterbury and Bristol is about finished as far east as Greystone; the work was suspended between Greystone and Bristol in October, 1907, also on the Terryville tunnel, and has not yet been resumed.

At New Haven, Conn., the work of providing additional tracks and widening the cut through the city is finished, four tracks having been put into operation during the year. There remain to be constructed approaches to the Fair and Crown street bridges from State street. Work will be finished next year on the viaduct which is to carry the street railway tracks now on State street.

The double-track connecting line in Providence, R. I., including a tunnel under the river to East Providence, 2.70 miles, is about finished. Progress is being made on the viaduct leading from the west portal of the tunnel; the new drawbridge over the Seekonk river at the east portal is in place. It is expected that the remaining construction work, including track laying, signals, interlocking, etc., will be finished during 1908.

During the year 34 grade crossings were eliminated in the following states: New York, 12; Connecticut, 12; Rhode Island, 2; Massachusetts, 8.

In Boston, Mass., the elimination of the Dudley street grade crossing, including four-track masonry for Dudley street, Norfolk avenue, Cottage and Clapp streets, has been finished and the grade crossing discontinued. Plans for the elimination of nine highway crossings in Boston are complete and the Court has ordered work to proceed. The necessary real estate is being secured. At the Northern avenue freight terminal extensive changes necessitated by the change of the street have been carried on in conjunction with the work done by the city, and are now about 50 per cent. finished.

At New Bedford, Mass., work on the elimination of nine highway crossings is about finished, all the masonry having been put up and the grade crossings discontinued. Work is well under way on the elimination of grade crossings in Southbridge and Cambridge streets in Worcester. It is expected to finish similar work at Fairmount avenue and Bridge street in Hyde Park during the coming year. Work on the elimination of the grade crossing at County road, Barnstable, Mass., is to be finished in October, 1908.

In East Hartford, Conn., the grade crossings at White's crossing, Putnam and Main streets have been eliminated.

The work of strengthening bridges to carry heavier rolling stock between Waterbury, Conn., and Winsted, and between Concord Junction, Mass., and Lowell, has been finished. Bridge improvement work includes a new drawbridge over the Taunton river at Somerset, Mass., to be finished in October, 1908. At Niantic, Conn., the new double-track rolling lift drawbridge over the Niantic river has been finished and put in service. The long trestle between Saybrook Point, Conn., and Fenwick has been filled in, except three openings, where new trestles have been built.

Work has been started gauntleting tracks over the Thames river bridge at New London, Conn., to replace the present double tracks, the heavier trains now in service necessitating the further use of the bridge as a single-track structure.

A new four-track bridge is being built over Jackson street, Holyoke, Mass., in connection with the extension of that street by the city. The double-track steel bridge at Massachusetts avenue, Boston, has been renewed and pier masonry extended over four blocks. Bridge No. 27 over the Shetucket river at Willimantic, Conn., has been renewed, and the old bridge at Versailles, Conn., has been replaced by a concrete arch. The new drawbridges on the Harlem River branch at Pelham Bay, N. Y., and over the Bronx river are about finished. Extensive bridge renewals were also made at other points.

NORFOLK & SOUTHERN.—In reports made by the receivers of this road, to the Federal Court, various recommendations for betterments, it is said, are made, including: the completion of the bridge across the Albemarle sound at an additional cost of $580,000, $221,000 having already been expended, when

work was stopped on account of lack of funds; conversion of three of the present wooden bridges to steel structures at a cost of $17,500; expenditure of $119,000 for ditching, banking and general improvement, and the expenditure of $65,000 for rearrangement and enlargement of shops, including those at New Bern, N. C.

OHIO ELECTRIC.—Despatches from Bellefontaine, Ohio, say that the line from Lakeview, Ohio, north to Lima, was completed last week. (Sept. 11, p. 933.)

OKANOGAN ELECTRIC.—The main line of this proposed road from the junction of the Okanogan and Columbia rivers, in the state of Washington, north to a connection with the Vancouver, Victoria and Eastern extension of the Great Northern, about 80 miles, will pass through the towns of Loomis, Wash.; Okanogan, Ophir, Malott and Brewster, and there will also be branches to Coconully, Omak and Riverside. A. M. Dewey, President, who is also president of the Q. S. Mining Co., said that the tonnage of ore already under contract is 624,000 tons a year. This company owns water rights which will develop not less than 30,000 h.p. Part of this power will be utilized by the railroad, the rest being sold for light and power to mines and manufacturers and for the lighting of towns along the line. From Fish lake to the Columbia river the road passes through what is said to be one of the greatest irrigation districts in America. The Federal Government has about completed irrigation ditches to reclaim some 15,000 acres of arid or semi-arid lands. The construction of the road has no large engineering problems, the grades being slight. (Oct. 23, p. 1227.)

ONTARIO ROADS.—A company is being formed with $1,000,000 capital to build a line in the Cobalt district. The proposed route is from Lake Temiskaming to Upper Satika Lake, about 28 miles. The line is to be built to carry silver ore from the mines. W. H. Rowley, J. N. Fortin, G. H. Millem, J. Caron, J. E. Gravelle and D. Caron, of Hull, Que., are said to be interested.

PACIFIC & SOUTH-EASTERN.—President H. G. Platt, San Francisco, Cal., is quoted as saying that as soon as the pending negotiations have been concluded for a terminal site in Tacoma, Wash., work will be started on this proposed line. The company was organized in March to build from Tacoma east about 260 miles to Walla Walla. (R. R. G., May 8, page 656.)

ST. PAUL BRIDGE & TERMINAL RAILWAY.—Incorporated with $500,000, capital to build a line from the unloading docks of the stock yards, at St. Paul, Minn., north to a point opposite Deacons Bluff, where a new bridge is to be built over the Mississippi river. Total length will be 3½ miles. The cost of the line and bridge will be $400,000. The road is to be built to furnish a shorter route for handling stock cars between the St. Paul and South St. Paul stock yards, and will be eight miles shorter than the present way, via Inver Grove, over the Stockyards Terminal Railway, which was organized about a year and a half ago to handle the traffic to and from the stock yards. The incorporators of the new company include: W. Magivny, President of the Stockyards Terminal Railway Co.; J. S. Bangs, Manager for Swift & Co., and J. Strawhorn. The first board of directors includes also A. R. Fay and L. F. Swift, of Chicago.

ST. LOUIS SOUTHWESTERN.—The report of this company for the year ended June 30, 1908, shows that during the year the company bought from the Lufkin Land & Lumber Co. 15½ miles of standard gage railroad, in line with the surveys of the proposed extension of the Lufkin branch in Texas. During the year about $5,000 was spent in rebuilding this 15½ miles, which extends from a point near Warsaw, Tex., to Pine Prairie. Work on the construction of the Little Rock branch extension into Argenta, Ark., about three miles, has been continued, grading now being finished and track laid ready for connection with other roads at the terminus of the extension. Other improvements carried out include a number of new steel bridges.

SHREVEPORT NORTHEASTERN.—Construction work on this line from Shreveport, La., east to Minden was commenced two miles east of Shreveport last week.

TEXAS ROADS.—Application has been made at Austin, Tex., for a charter to build a line from Marshall, Tex., south to Beaumont, about 200 miles. L. E. Walker, J. Lake and others of Marshall are promoting the enterprise.

UNION PACIFIC.—Reports from Cheyenne, Wyo., say that the Athol-Borie cut-off in Colorado, over which freight to and from Denver will be hauled, eliminating Cheyenne and Athol Hill from its route, has been turned over to the railroad company by the contractors, Kilpatrick Bros. & Collins. (R. R. G., March 13, p. 395.)

The same contractors are making rapid progress on the grading for the double track between Green river, Wyo., and Granger, 30 miles. It is expected that this work will be finished this year. (Aug. 21, p. 789.)

WESTERN PACIFIC.—The annual report of the Denver & Rio Grande says, under date of August 26, that the Western Pacific has more than 400 miles of track laid in Utah, Nevada and California, and the greater portion of this has been ballasted. About 70 per cent. of the grading on the entire line is finished and about 68 per cent. of the tunnel work excavated.

Railroad Financial News.

BANGOR & AROOSTOOK.—T. H. Phair, W. C. Spalding, John Watson and George E. Wicks have been elected additional directors, thus making the total number of directors 11.

CHICAGO, ROCK ISLAND & PACIFIC.—Speyer & Co., New York, have bought, it is said, $9,000,000 refunding mortgage 4 per cent. bonds of 1904-1934, of which there were $72,290,000 outstanding in February, 1908. The cash received for these bonds is to be used to refund short term notes and for improvements and extensions.

ILLINOIS CENTRAL.—John G. Shedd has been elected a director, succeeding J. B. W. Cutting.

MAINE CENTRAL.—John L. Billard, Samuel Heminway and Frank T. Brown have been elected directors. L. C. Ledyard has resigned; thus the total number of directors has been increased from 12 to 14.

MUNICIPAL TRACTION CO. (CLEVELAND).—The directors of the city of Cleveland voted against ratifying the franchise granted to the Municipal Traction Co. on April 27, 1908. Under this franchise the Municipal Traction Co. has been operating the street railways of Cleveland under lease from the Cleveland Railway. This lease is now rendered void, and suit has been brought to place the Municipal Traction Co. in the hands of a receiver because of unpaid bills for equipment.

Tom Johnson, Mayor of Cleveland and chief organizer of the Municipal Traction Co., has made a statement promising to surrender the lines to the Cleveland Railway Co. at once if the Railway company will return the three-cent lines to their former owners. The three-cent lines were built by Mayor Johnson to compete with the old lines before the lease of the Railway company by the Municipal company.

NORFOLK & SOUTHERN.—The receivers are to pay, it is said, the November 1 interest on about $5,506,109 underlying bonds, but will default the interest due on the $14,000,000 first and refunding 5 per cent. mortgage bonds.

SEABOARD AIR LINE.—The Bondholders' Protective Committee, William Salomon, Chairman, announces that a majority of the Atlanta-Birmingham first mortgage 4 per cent. 30-year bonds have been deposited under agreement of September 2, and the time for the deposit of bonds has been extended to November 4.

WABASH-PITTSBURGH TERMINAL.—William Green, representing the trustee for the first mortgage bonds, and John Quinn, representing the trustee for the second mortgage bonds, have appealed to the United States Court presenting arguments against the proposed issue of $954,000 receiver certificates, which were to provide funds for increased equipment and double-track work.